Allegheny Energy Center Project Installation Permit Application

Air Quality Modeling Protocol

Invenergy LLC
Allegheny County, PA

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Submitted by:

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1. INTRODUCTION

Allegheny Energy Center LLC (AEC), a wholly-owned subsidiary of Invenergy LLC (Invenergy), is proposing to construct and operate the AEC (Project), a nominal 626 megawatt (MW), natural gas-fired combined-cycle power plant to be located in Elizabeth Township, Allegheny County, Pennsylvania (Project Site). Invenergy is submitting a Permit Application to the Allegheny County Health Department (ACHD) for an Installation Permit in accordance with ACHD's Article XXI §2102.04. Emissions from this stationary source will trigger major source status under the Clean Air Act (CAA) New Source Review (NSR) and Title V operating permit (TVOP) programs. The Project will consist of a "one-on-one" (1 x 1), nominal 626 MW power plant that will include one combustion turbine (CT), one heat recovery steam generator (HRSG) with supplemental duct firing, and one steam turbine (ST). The proposed General Electric (GE) model (7HA.02) CT will fire clean low sulfur pipeline-quality natural gas. In addition to the CT and associated pieces of equipment, one auxiliary boiler, one dew point heater, one emergency generator, one fire water pump, and four above-ground storage tanks (AST) will be included as part of the Project.

The proposed Project will trigger major NSR. The Prevention of Significant Deterioration (PSD) rules will apply for all regulated NSR pollutants except for those pollutants or precursor pollutants for which the area is not in attainment with respect to the National Ambient Air Quality Standards (NAAQS). The Nonattainment NSR (NNSR) rules will apply for those areas classified as nonattainment with respect to the NAAQS.

AEC will be located in Allegheny County, which is managed as a moderate nonattainment area for ozone due to its inclusion in the Northeast Ozone Transport Region (OTR). In addition, portions of Allegheny County, including Elizabeth Township where the AEC will be located, are designated as nonattainment for 2010 1-hour sulfur dioxide (SO_2), and the entire county is classified as nonattainment for the 2015 annual particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) NAAQS. It should be noted that portions of Allegheny County, including the Liberty-Clairton Area (The City of Clairton and Boroughs of Glassport, Liberty, Lincoln, and Port View) are classified nonattainment with the 1997 24-hour $PM_{2.5}$ NAAQS.

The proposed Project qualifies as a 100 ton per year (tpy) major stationary source per the NSR regulation as a result of potential emissions exceeding the major NSR 100 tpy emissions threshold for at least one regulated NSR pollutant. As a major stationary source that has potential emissions exceeding the PSD significant emissions rates (SER) for carbon monoxide (CO), nitrogen dioxide (NO_2), and particulate matter less than 10 microns (PM_{10}) a PSD permit will be required, and an air quality modeling analysis will need to be performed. In addition, the proposed Project is anticipated to be major for NNSR ozone precursors, from NO_X (by exceeding the major NSR 100 tpy emissions threshold) and volatile organic compounds (VOC) (by exceeding the major NSR 50 tpy emissions threshold), and for $PM_{2.5}$ precursors from NO_X. As a result, impacts will be evaluated from ozone and NO_X precursors. ACHD also has requested a $PM_{2.5}$ air quality modeling analysis, including an evaluation for $PM_{2.5}$ precursors, be completed since the project has the potential to impact the $PM_{2.5}$ nonattainment areas.

The Project's emissions of air toxics exceed the de minimis levels determined under ACHD's "Policy for Air Toxics Review of Installation Permit Applications" (Policy). An air toxics modeling analysis will be performed to evaluate carcinogenic and non-carcinogenic health risks of the Project. The results of this analysis will be compared to the cumulative Maximum Individual Carcinogenic Risk (MICR) of 1×10^{-5} and the Hazard Quotient (HQ) and Cumulative Hazard Index (HI) which are 1.0 and 2.0, respectively.

Invenergy has prepared the air quality modeling protocol to outline the procedures that will be used to demonstrate compliance with the NAAQS and PSD increments for the PSD permitting requirements and air toxics health risks for the ACHD Policy. The air quality modeling protocol documents the technical approach and information that will be used in the air quality modeling analyses. In addition, this air quality modeling protocol addresses the proposed approach for evaluating Class I air quality related values (AQRVs). Specific information is presented in the following sections of the air quality modeling protocol:

- Section 2 – Facility Description and Project Overview
- Section 3 – Emissions Inventory Summary

- Section 4 – Air Quality Modeling Approach and Technical Information
- Section 5 – Class I Analyses
- Section 6 – Presentation of Air Quality Modeling Results
- Section 7 – References

2. FACILITY DESCRIPTION AND PROJECT OVERVIEW

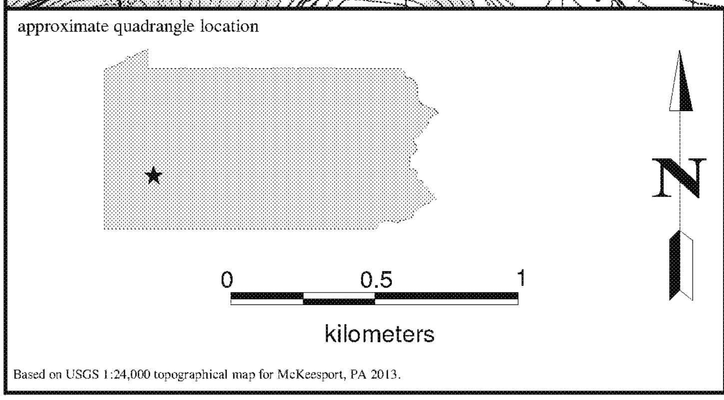
This section of the air quality modeling protocol contains a description of the Project, as well as a description of the geographic and topographic setting for the AEC. The Project description contains general information on the emissions units and a summary of the proposed Project.

2.1 AEC LOCATION

The Project will be located on an approximate 14.2-acre site in the furthermost southeast point of Elizabeth Township, Allegheny County, Pennsylvania. The Project site is south of Smithdale Road and the Youghiogheny River and north of the Westmoreland County line. The Project Site is situated in southwestern Pennsylvania, approximately 29 kilometers (km) southeast of Pittsburgh. A Project location map is provided in Figure 2-1. The geographical coordinates for the approximate center of the facility are:

- Universal Transverse Mercator (UTM) Easting: 602,441.60 meters (m)
- Universal Transverse Mercator (UTM) Northing: 4,453,386.84 m
- UTM Zone : 17
- North American Datum (NAD): 1983
- Longitude (degrees, minutes, seconds): 79°47' 45.40"W
- Latitude (degrees, minutes, seconds): 40°13' 28.74"N

The proposed Project Site is at a base elevation of approximately 309.4 m above mean sea level (amsl). The Project Site is situated approximately 400 m from the banks of the Youghiogheny River at its nearest point. A review of topographical features within a 5 km radius of the Project Site, using a United States Geological Survey (USGS) Quadrangle map and aerial imagery, indicates that the terrain elevations vary from approximately 225 m at the Youghiogheny River to the north at the lowest point, to approximately 385 m to the west at the highest point. The geography surrounding the proposed AEC is generally characterized as rolling terrain within the Pittsburgh Low Plateau.



Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

Figure 2-1
Facility Location Map

2.2 PROPOSED PROJECT

The Project includes one combined-cycle power block in a "one-on-one" (1 x 1) configuration, consisting of a CT, HRSG, steam turbine ST, and ancillary equipment. The major components of the Project include:

- One natural gas-fired GE 7HA.02 CT and one HRSG (with supplementary fired duct burner [DB]) – equipped with selective catalytic reduction (SCR) for NO_X control and an oxidation catalyst for CO and VOC control
- One 88.7 million British thermal units per hour (MMBtu/hr) auxiliary boiler, natural gas-fired
- One 3 MMBtu/hr dew point heater, natural gas-fired
- One 2,000 Kilowatt (kW) emergency generator, ultra-low sulfur diesel (ULSD) fired
- One 315 brake horse power (BHP) fire water pump, ULSD-fired
- Two diesel fuel, one lubricating oil, and one aqueous ammonia AST

3. EMISSIONS INVENTORY SUMMARY

This section of the air quality modeling protocol discusses the various emission inventories and the physical stack characteristics that will be considered as part of the PSD air quality modeling evaluation. In order to complete a PSD evaluation, an initial inventory of project-related emissions must be developed. Pollutants with project-related emissions resulting in modeled concentrations that are greater than the PSD Significant Impact Levels (SILs) will require a NAAQS and PSD increment analysis with local source emissions included. In addition, an air toxics emissions inventory will be developed in order to complete the ACHD risk assessment. It should be noted that emission rates have not been finalized for the Project; therefore, a preliminary summary of those pollutants expected to be emitted from the proposed sources is provided at this time.

3.1 WORST-CASE LOAD CONDITIONS

A load analysis will be performed for the turbines to identify the worst-case operational conditions. The worst-case load condition analysis for the turbines will consist of full and partial load emissions (approximately 40-50%) operating loads for natural gas. The operating loads will be evaluated at five ambient conditions: 50-year minimum, winter, average, summer, and 50-year maximum. The partial operating load scenarios will not include duct burning since the duct burners are not typically operated when operating at partial loads. Only the 100% operating level will be evaluated with and without duct burners. Three startup conditions will be evaluated: hot, warm, and cold. A summary of the operational conditions to be evaluated is presented in Table 3-1. The worst-case operational conditions and the design load identified will be evaluated fully for the subsequent emissions inventories described in the following sections.

3.2 SIGNIFICANT IMPACT ANALYSIS EMISSIONS INVENTORY

For the Significant Impact Analysis (SIA), project-related emissions from the proposed sources will be used to model concentrations for comparison to the SILs. A summary of CO, NO_2, and $PM_{2.5}$ emissions sources from the proposed Project are presented in Table 3-2. Project emissions rates will be developed using vendor supplied emissions factors and/or AP-42 emissions factors.

Table 3-1
Summary of Evaluated Turbine Operating Conditions
Invenergy LLC - Allegheny Energy Center

Case Number	Ambient Temperature (°F)	Turbine Load	Duct Firing
15	-26	100%	Operating
17		100%	Off
18		50%	Off
4	9	100%	Operating
5		100%	Off
1	53	100%	Operating
2		100%	Off
11	87.5	100%	Operating
13		100%	Off
14		37%	Off
21	101.8	100%	Operating
23		100%	Off
24		41%	Off
Cold Start	N/A	N/A	N/A
Warm Start	N/A	N/A	N/A
Hot Start	N/A	N/A	N/A
Shutdown	N/A	N/A	N/A

Table 3-2

Summary of Proposed Emissions Sources

Invenergy LLC - Allegheny Energy Center

Source	CO	NO_2	$PM_{2.5}$	PM_{10}
Auxiliary Boiler	✓	✓	✓	✓
Dew Point Heater	✓	✓	✓	✓
Emergency Generator	✓	✓	✓	✓
Fire Water Pump	✓	✓	✓	✓
HRSG	✓	✓	✓	✓

Invenergy is proposing to not include the emergency generator and fire water pump (i.e., intermittent emissions sources) in the 1-hour NO_2 air quality modeling evaluations since it is reasonably assumed that they will not contribute to the distribution of daily maximum 1-hour concentrations based on guidance contained in U.S. EPA's March 1, 2011 memorandum (U.S. EPA 2011). Specifically, the guidance identifies an intermittent emissions source as a source that operates a limited number of hours (less than 500 hours), operates on a random schedule that cannot be controlled (except for periodic readiness testing), and is not directly related to the production of a product. The emergency generator and fire water pump at the Facility will meet all three of these intermittent unit criteria and therefore are not expected to contribute to the distribution of daily maximum 1-hour concentrations. In addition, the emergency generator and fire water pump will utilize ultra-low sulfur diesel (ULSD) will not operate during a combustion turbine startup for emergency or periodic readiness testing purposes.

For other short-term modeling (e.g., 1- and 8-hour CO, 24-hour PM_{10} and $PM_{2.5}$), the modeled emissions rates for the emergency generator and fire water pump will be based on routine (30-minutes, once per week) operational testing scenario. In addition, annual average emissions rates will be based on the assumption that annual non-emergency operation will be limited to less than 100 hours per consecutive 12-months for each engine.

3.3 FACILITY-WIDE EMISSIONS INVENTORY

It is anticipated that NO_2 emissions associated with the proposed Project will result in ambient air concentrations greater than the 1-hour NO_2 SIL. The CO, annual NO_2, $PM_{2.5}$, and PM_{10} emissions associated with the proposed Project are expected to result in ambient concentrations less than the respective SILs. Invenergy will use the same emissions inventory developed for the SIA to evaluate the facility-wide 1-hour NO_2 NAAQS.

3.4 LOCAL SOURCE EMISSIONS INVENTORY

A cumulative NO_X emissions inventory will be developed to demonstrate compliance with the 1-hour NO_2 NAAQS and will include an emissions inventory of local sources. Guidance contained in U.S. EPA's March 1, 2011 memorandum (U.S. EPA 2011) will be followed. Per the guidance, only local NO_X emissions sources that are within 10 km of the Project will be included in the NO_X local source inventory. This guidance assumes that the region of significant concentration gradient of a local source is equivalent to 10 times the local source release height. The 10 km distance was developed based on stack heights less than or equal to 100 m. Invenergy reviewed local sources outside of the 10 km and identified one source with a stack height greater than 100 m. The Genon Energy Inc., Cheswick Station boiler has a stack height of 168.4 m and is located about 35 km away from the Project site. The summary of local sources to be included in the 1-hour NO_2 NAAQS evaluation is provided in Table 3-3. The stack characteristics and emissions rates were provided by ACHD.

3.5 AIR TOXICS EMISSIONS INVENTORY

It is anticipated that the Project exceeds the de minimis emissions rates levels for Hazardous Air Pollutants (HAPs) for "all other air toxics", as shown in Table 3-4, in accordance with the Policy under ACHD Air Quality Program. Hence, an air toxics modeling analysis will be required to be performed to evaluate the effects of the Project for carcinogenic and non-carcinogenic health risks.

The air toxics modeling evaluation requires the development of the appropriate air toxics emissions inventory consisting of Project emissions units. The air toxics emissions inventory should be representative of worst-case emissions. Air toxics emissions from the Project's emissions units will be used to model concentrations for comparison to human health risk thresholds. To evaluate the human health risk on an annual averaging period, the annualized emissions rates for each air toxic will be calculated by taking the total pounds per year (lb/yr) of emissions for each emissions unit and dividing the total emissions by the annual operating hours for the respective emissions unit.

Potential emissions from the CT with auxiliary-fired HRSG with DB, auxiliary boiler, and dew point heater will be included in the air toxics modeling evaluation. Since the emergency generator and fire water pump engines are emergency units and will be permitted for 100 hours of operation per year for weekly testing, these two emissions units will not be included as part of the air toxics modeling analysis.

Table 3-3
Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_X (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
BASIC CARBIDE CORP/BUENA VISTA	CARB1	0.11	602,380.01	4,457,460.32	282.00	4.27	293.15	0.001	0.30	4.07
CLAIRTON SLAG INC/WEST ELIZABETH PAVING MATL PLT	SLAG1	8.10	593,695.99	4,458,273.31	230.00	8.84	295.22	23.84	0.40	10.02
KELLY RUN SANI/MSW LDFL	KELLY1	15.63	594,649.01	4,456,398.28	355.00	10.67	1,160.93	0.80	2.03	8.35
GENON POWER MIDWEST LP/ELRAMA POWER PLT	ELRAMA	561.12	592,059.01	4,456,413.28	229.00	119.48	324.80	15.07	7.92	10.81
Eastman Chemical Resins, Inc. - BOILERS 1-2	ECRB12	0.94	593,092.57	4,457,578.88	225.00	14.33	616.48	8.70	0.70	10.25
Eastman Chemical Resins, Inc. - BOILERS 3-4	ECRB34	1.60	593,092.57	4,457,578.88	225.00	18.29	616.48	17.40	0.70	10.25
Eastman Chemical Resins, Inc. - NO. 5 TRANE BOILER	ECRB5	12.72	593,100.94	4,457,590.09	225.00	22.25	560.93	15.90	0.91	10.24
Eastman Chemical Resins, Inc. - HOT OIL HEATER, NG	ECRHOH	1.83	593,092.57	4,457,578.88	225.00	6.10	616.48	7.45	0.34	10.25
Eastman Chemical Resins, Inc. - LTC Unit #1	ECRLTC1	1.02	593,092.57	4,457,578.88	225.00	6.10	810.78	16.76	0.30	10.25
Eastman Chemical Resins, Inc. - LTC Unit #2	ECRLTC2	1.11	593,092.57	4,457,578.88	225.00	6.10	616.33	23.77	0.30	10.25
Eastman Chemical Resins, Inc. - Thermal Oxidizer	ECRTO	11.42	593,092.57	4,457,578.88	225.00	15.24	293.15	0.12	0.24	10.25
Eastman Chemical Resins, Inc. - Misc. NG	ECRMNG	0.93	593,092.57	4,457,578.88	225.00	3.05	293.15	0.01	0.03	10.25
Eastman Chemical Resins, Inc. - Hydro Unit Heater, NG	ECRHNG	1.79	593,092.57	4,457,578.88	225.00	6.10	293.15	34.74	0.06	10.25
Eastman Chemical Resins, Inc. - Vehicle Exhaust	ECRVE	3.62	593,092.57	4,457,578.88	225.00	6.10	293.15	0.01	0.03	10.25
Peoples Natural Gas Co/WALL Comp. Station	PNGCS	42.50	595,188.70	4,453,823.64	318.00	6.10	293.15	0.01	0.24	7.27
US STEEL IRVIN Boiler #1	IRBLR1	19.9725	593,149.00	4,465,476.00	287.00	19.50	635.38	10.23	1.10	15.25
US STEEL IRVIN Boiler #2	IRBLR2	23.4439	593,171.00	4,465,165.00	287.00	21.94	537.05	8.00	1.28	14.99
US STEEL IRVIN Boilers #3-4	IRBLR3	12.6494	593,419.00	4,465,596.00	287.00	22.86	644.26	9.70	1.42	15.18
US STEEL IRVIN 80" Mill Reheat Furnace 1	IR80IN1	130.2518	593,177.00	4,465,871.00	287.00	20.00	710.38	29.43	1.98	15.55
US STEEL IRVIN 80" Mill Reheat Furnace 2	IR80IN2	129.5317	593,178.00	4,465,884.00	287.00	20.00	710.38	29.43	1.98	15.56
US STEEL IRVIN 80" Mill Reheat Furnace 3	IR80IN3	121.4517	593,179.00	4,465,896.00	287.00	20.00	710.38	29.43	1.98	15.57
US STEEL IRVIN 80" Mill Reheat Furnace 4	IR80IN4	132.4266	593,180.00	4,465,909.00	287.00	20.00	710.38	29.43	1.98	15.58
US STEEL IRVIN 80" Mill Reheat Furnace 5	IR80IN5	120.0247	593,181.00	4,465,923.00	287.00	20.00	710.38	29.43	1.98	15.59
US STEEL IRVIN 80" Mill Reheat Waste Stack 6	IR80INW	13.2347	593,243.00	4,465,922.00	287.00	28.34	710.38	29.43	1.82	15.55
US STEEL IRVIN #1 Galv Line Preheat	IRGALV1	4.091	593,352.00	4,465,406.00	287.00	25.30	944.26	9.48	1.42	15.07
US STEEL IRVIN #2 Galv Line Preheat	IRGALV2	4.8934	593,350.00	4,465,386.00	287.00	26.82	944.26	2.66	1.37	15.05
US STEEL IRVIN HPH Annealing Furnaces (seg a)	IRHPH_a	3.3062714	593,328.56	4,465,585.48	287.00	21.33	527.60	10.00	0.76	15.23
US STEEL IRVIN HPH Annealing Furnaces (seg b)	IRHPH_b	3.3062714	593,325.15	4,465,553.51	287.00	21.33	527.60	10.00	0.76	15.20
US STEEL IRVIN HPH Annealing Furnaces (seg c)	IRHPH_c	3.3062714	593,321.76	4,465,521.64	287.00	21.33	527.60	10.00	0.76	15.18
US STEEL IRVIN HPH Annealing Furnaces (seg d)	IRHPH_d	3.3062714	593,318.44	4,465,489.75	287.00	21.33	527.60	10.00	0.76	15.16
US STEEL IRVIN HPH Annealing Furnaces (seg e)	IRHPH_e	3.3062714	593,315.27	4,465,457.80	287.00	21.33	527.60	10.00	0.76	15.13
US STEEL IRVIN HPH Annealing Furnaces (seg f)	IRHPH_f	3.3062714	593,311.57	4,465,425.87	287.00	21.33	527.60	10.00	0.76	15.11
US STEEL IRVIN HPH Annealing Furnaces (seg g)	IRHPH_g	3.3062714	593,308.19	4,465,393.98	287.00	21.33	527.60	10.00	0.76	15.09
US STEEL IRVIN Open Coil Annealing	IROCA	13.7173	593,335.00	4,465,243.00	287.00	21.33	310.94	10.52	2.96	14.95
US STEEL IRVIN Continuous Annealing	IRCONTA	6.0931	593,341.00	4,464,903.00	287.00	36.57	513.72	10.52	1.07	14.68
US STEEL IRVIN Peach Tree Flare A&B	IRPTF	4.4282	592,868.00	4,464,808.00	333.00	18.28	1,273.00	20.00	0.63	14.90
US STEEL IRVIN COG Flares 1-3	IRCOGF	2.7033	593,237.00	4,464,601.00	287.00	8.99	1,273.00	20.00	0.63	14.51
US STEEL CLAIRTON Quench Tower 1	CLQNCH1	0.69	595,964.00	4,461,731.00	231.00	30.48	358.49	3.54	6.80	10.56
US STEEL CLAIRTON Quench Tower 5	CLQNCH5	0.93	595,472.00	4,462,078.00	231.00	30.48	358.49	3.54	7.10	11.14
US STEEL CLAIRTON Quench Tower 7	CLQNCH7	1.05	595,430.00	4,462,047.00	231.00	37.18	362.77	2.99	8.81	11.14
US STEEL CLAIRTON Quench Tower B	CLQNCHB	0.87	595,460.00	4,462,374.00	231.00	41.15	368.55	4.30	9.51	11.38
US STEEL CLAIRTON Quench Tower C	CLQNCHC	0.00	595,622.00	4,462,186.00	231.00	50.00	378.00	3.66	12.67	11.13
US STEEL CLAIRTON Quench Tower 5A	CLQNCH5A	0.00	595,223.00	4,462,366.00	231.00	50.00	378.00	3.66	12.67	11.52
US STEEL CLAIRTON Quench Tower 7A	CLQNCH7A	0.00	595,188.00	4,462,316.00	231.00	50.00	378.00	3.66	12.67	11.50
US STEEL CLAIRTON PEC Baghouse 1-3 (seg a)	CLPEC1a	5.65	595,865.75	4,461,872.18	231.00	24.99	324.83	8.84	1.22	10.74
US STEEL CLAIRTON PEC Baghouse 1-3 (seg b)	CLPEC1b	5.65	595,861.10	4,461,877.19	231.00	24.99	324.83	8.84	1.22	10.74
US STEEL CLAIRTON PEC Baghouse 1-3 (seg c)	CLPEC1c	5.65	595,856.39	4,461,882.39	231.00	24.99	324.83	8.84	1.22	10.75
US STEEL CLAIRTON PEC Baghouse 13-15 (seg a)	CLPEC13a	7.34	595,324.70	4,462,210.47	231.00	24.99	324.83	16.95	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 13-15 (seg b)	CLPEC13b	7.34	595,320.28	4,462,215.54	231.00	24.99	324.83	16.95	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 13-15 (seg c)	CLPEC13c	7.34	595,315.94	4,462,220.42	231.00	24.99	324.83	16.95	0.91	11.35
US STEEL CLAIRTON PEC Baghouse 19-20 (seg a)	CLPEC19a	8.28	595,319.97	4,462,206.37	231.00	24.99	304.83	15.60	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 19-20 (seg b)	CLPEC19b	8.28	595,315.54	4,462,211.35	231.00	24.99	304.83	15.60	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 19-20 (seg c)	CLPEC19c	8.28	595,311.02	4,462,216.53	231.00	24.99	304.83	15.60	0.91	11.35
US STEEL CLAIRTON PEC Baghouse B (seg a)	CLPECBa	3.68	595,439.48	4,462,426.08	231.00	15.54	324.83	13.78	1.22	11.43
US STEEL CLAIRTON PEC Baghouse B (seg b)	CLPECBb	3.68	595,430.87	4,462,433.71	231.00	15.54	324.83	13.78	1.22	11.45
US STEEL CLAIRTON PEC Baghouse B (seg c)	CLPECBc	3.68	595,420.91	4,462,441.34	231.00	15.54	324.83	13.78	1.22	11.46
US STEEL CLAIRTON PEC Baghouse C	CLPECC	0.00	595,678.00	4,462,007.00	231.00	30.00	328.20	15.10	2.49	10.96

Table 3-3
Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_X (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
US STEEL CLAIRTON Battery 1 Underfiring	CLCOMB1	192.13	595,871.00	4,461,845.00	231.00	68.58	526.49	7.59	2.44	10.71
US STEEL CLAIRTON Battery 2 Underfiring	CLCOMB2	181.10	595,866.00	4,461,852.00	231.00	68.58	534.27	7.71	2.44	10.72
US STEEL CLAIRTON Battery 3 Underfiring	CLCOMB3	198.62	595,742.00	4,461,989.00	231.00	68.58	539.27	7.38	2.44	10.90
US STEEL CLAIRTON Battery 13 Underfiring	CLCOMB13	129.75	595,389.00	4,462,164.00	231.00	68.58	535.38	4.48	3.05	11.26
US STEEL CLAIRTON Battery 14 Underfiring	CLCOMB14	121.81	595,380.00	4,462,174.00	231.00	68.58	536.49	4.30	3.05	11.27
US STEEL CLAIRTON Battery 15 Underfiring	CLCOMB15	152.02	595,253.00	4,462,318.00	231.00	68.58	541.49	4.48	3.05	11.46
US STEEL CLAIRTON Battery 19 Underfiring	CLCOMB19	339.26	595,273.00	4,462,117.00	231.00	76.20	519.27	3.72	4.72	11.30
US STEEL CLAIRTON Battery 20 Underfiring	CLCOMB20	546.23	595,258.00	4,462,134.00	231.00	76.20	542.05	4.27	4.72	11.32
US STEEL CLAIRTON B Battery Underfiring	CLCOMBB	371.80	595,477.00	4,462,406.00	231.00	96.01	515.38	5.06	4.95	11.40
US STEEL CLAIRTON C Battery Underfiring	CLCOMBC	0.00	595,768.00	4,462,126.00	231.00	98.14	503.20	5.81	3.66	11.00
US STEEL CLAIRTON Boiler 1	CLBLR1	455.29	595,004.00	4,462,714.00	231.00	57.91	457.60	29.56	2.67	11.93
US STEEL CLAIRTON Boiler 2	CLBLR2	170.92	594,989.00	4,462,717.00	231.00	57.91	437.05	21.94	2.13	11.94
US STEEL CLAIRTON Boiler R1	CLBLRR1	6.09	594,892.00	4,462,604.00	231.00	50.29	524.27	7.47	2.59	11.91
US STEEL CLAIRTON Boiler R2	CLBLRR2	4.21	594,892.00	4,462,604.00	231.00	50.29	524.27	7.47	2.59	11.91
US STEEL CLAIRTON Boiler T1	CLBLRT1	14.32	594,845.00	4,462,563.00	231.00	26.52	544.27	9.05	1.46	11.91
US STEEL CLAIRTON Boiler T2	CLBLRT2	10.85	594,837.00	4,462,569.00	231.00	26.52	543.16	9.05	1.46	11.92
US STEEL CLAIRTON SCOT Incinerator	CLSCOT	0.90	595,575.00	4,462,036.00	231.00	45.72	638.16	17.43	1.17	11.04
US STEEL CLAIRTON Misc. Flaring	CLFLARE	19.81	595,580.00	4,462,050.00	231.00	8.26	1,273.00	20.00	0.63	11.05
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S1	0.03141	595,736.56	4,461,971.88	231.00	10.50	1,366.49	6.10	0.46	10.89
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S2	0.03141	595,753.45	4,461,952.91	231.00	10.50	1,366.49	6.10	0.46	10.87
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S3	0.03141	595,770.35	4,461,933.93	231.00	10.50	1,366.49	6.10	0.46	10.84
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S4	0.03141	595,787.25	4,461,914.95	231.00	10.50	1,366.49	6.10	0.46	10.82
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S5	0.03141	595,804.15	4,461,895.97	231.00	10.50	1,366.49	6.10	0.46	10.79
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S6	0.03141	595,821.05	4,461,876.99	231.00	10.50	1,366.49	6.10	0.46	10.77
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S7	0.03141	595,837.95	4,461,858.01	231.00	10.50	1,366.49	6.10	0.46	10.74
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S8	0.03141	595,854.85	4,461,839.03	231.00	10.50	1,366.49	6.10	0.46	10.72
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S9	0.03141	595,871.75	4,461,820.05	231.00	10.50	1,366.49	6.10	0.46	10.69
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S10	0.03141	595,888.65	4,461,801.07	231.00	10.50	1,366.49	6.10	0.46	10.66
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S11	0.03141	595,905.55	4,461,782.09	231.00	10.50	1,366.49	6.10	0.46	10.64
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S12	0.03141	595,922.44	4,461,763.12	231.00	10.50	1,366.49	6.10	0.46	10.61
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S1	0.0458	595,275.68	4,462,318.79	231.00	10.80	1,366.49	6.10	0.46	11.45
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S2	0.0458	595,293.14	4,462,299.33	231.00	10.80	1,366.49	6.10	0.46	11.43
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S3	0.0458	595,310.61	4,462,279.87	231.00	10.80	1,366.49	6.10	0.46	11.40
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S4	0.0458	595,328.07	4,462,260.42	231.00	10.80	1,366.49	6.10	0.46	11.37
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S5	0.0458	595,345.54	4,462,240.96	231.00	10.80	1,366.49	6.10	0.46	11.35
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S6	0.0458	595,363.00	4,462,221.50	231.00	10.80	1,366.49	6.10	0.46	11.32
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S7	0.0458	595,380.46	4,462,202.04	231.00	10.80	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S8	0.0458	595,397.93	4,462,182.58	231.00	10.80	1,366.49	6.10	0.46	11.27
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S9	0.0458	595,415.39	4,462,163.13	231.00	10.80	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S10	0.0458	595,432.86	4,462,143.67	231.00	10.80	1,366.49	6.10	0.46	11.22
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S11	0.0458	595,450.32	4,462,124.21	231.00	10.80	1,366.49	6.10	0.46	11.19
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S1	0.0569	595,232.65	4,462,250.77	231.00	12.50	1,366.49	6.10	0.46	11.43
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S2	0.0569	595,250.06	4,462,231.15	231.00	12.50	1,366.49	6.10	0.46	11.40
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S3	0.0569	595,267.47	4,462,211.54	231.00	12.50	1,366.49	6.10	0.46	11.37
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S4	0.0569	595,284.88	4,462,191.92	231.00	12.50	1,366.49	6.10	0.46	11.35
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S5	0.0569	595,302.29	4,462,172.31	231.00	12.50	1,366.49	6.10	0.46	11.32
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S6	0.0569	595,319.71	4,462,152.69	231.00	12.50	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S7	0.0569	595,337.12	4,462,133.08	231.00	12.50	1,366.49	6.10	0.46	11.27
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S8	0.0569	595,354.53	4,462,113.46	231.00	12.50	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S9	0.0569	595,371.94	4,462,093.85	231.00	12.50	1,366.49	6.10	0.46	11.22
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S10	0.0569	595,389.35	4,462,074.23	231.00	12.50	1,366.49	6.10	0.46	11.19
US STEEL CLAIRTON B Battery Soaking	CLBBS1	0.0947	595,519.57	4,462,333.89	231.00	17.10	1,366.49	6.10	0.46	11.31
US STEEL CLAIRTON B Battery Soaking	CLBBS2	0.0947	595,536.28	4,462,315.20	231.00	17.10	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON B Battery Soaking	CLBBS3	0.0947	595,553.00	4,462,296.50	231.00	17.10	1,366.49	6.10	0.46	11.26
US STEEL CLAIRTON B Battery Soaking	CLBBS4	0.0947	595,569.72	4,462,277.80	231.00	17.10	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON B Battery Soaking	CLBBS5	0.0947	595,586.43	4,462,259.11	231.00	17.10	1,366.49	6.10	0.46	11.21
US STEEL CLAIRTON C Battery Soaking	CLBCS1	0.00	595,661.57	4,462,174.90	231.00	17.10	1,366.49	6.10	0.46	11.10

Table 3-3
Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_X (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
US STEEL CLAIRTON C Battery Soaking	CLBCS2	0.00	595,676.94	4,462,157.74	231.00	17.10	1,366.49	6.10	0.46	11.08
US STEEL CLAIRTON C Battery Soaking	CLBCS3	0.00	595,692.31	4,462,140.58	231.00	17.10	1,366.49	6.10	0.46	11.05
US STEEL CLAIRTON C Battery Soaking	CLBCS4	0.00	595,707.69	4,462,123.42	231.00	17.10	1,366.49	6.10	0.46	11.03
US STEEL CLAIRTON C Battery Soaking	CLBCS5	0.00	595,723.06	4,462,106.26	231.00	17.10	1,366.49	6.10	0.46	11.01
US STEEL CLAIRTON C Battery Soaking	CLBCS6	0.00	595,738.43	4,462,089.10	231.00	17.10	1,366.49	6.10	0.46	10.98
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P1	0.03141	595,747.54	4,461,978.87	231.00	8.50	1,033.16	3.05	1.59	10.89
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P2	0.03141	595,764.17	4,461,960.08	231.00	8.50	1,033.16	3.05	1.59	10.87
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P3	0.03141	595,780.80	4,461,941.28	231.00	8.50	1,033.16	3.05	1.59	10.84
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P4	0.03141	595,797.43	4,461,922.49	231.00	8.50	1,033.16	3.05	1.59	10.82
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P5	0.03141	595,814.06	4,461,903.69	231.00	8.50	1,033.16	3.05	1.59	10.79
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P6	0.03141	595,830.69	4,461,884.90	231.00	8.50	1,033.16	3.05	1.59	10.77
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P7	0.03141	595,847.31	4,461,866.10	231.00	8.50	1,033.16	3.05	1.59	10.74
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P8	0.03141	595,863.94	4,461,847.31	231.00	8.50	1,033.16	3.05	1.59	10.72
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P9	0.03141	595,880.57	4,461,828.51	231.00	8.50	1,033.16	3.05	1.59	10.69
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P10	0.03141	595,897.20	4,461,809.72	231.00	8.50	1,033.16	3.05	1.59	10.67
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P11	0.03141	595,913.83	4,461,790.92	231.00	8.50	1,033.16	3.05	1.59	10.64
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P12	0.03141	595,930.46	4,461,772.13	231.00	8.50	1,033.16	3.05	1.59	10.62
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P1	0.0458	595,266.65	4,462,308.76	231.00	8.80	1,033.16	3.05	1.59	11.45
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P2	0.0458	595,283.82	4,462,289.41	231.00	8.80	1,033.16	3.05	1.59	11.42
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P3	0.0458	595,300.99	4,462,270.06	231.00	8.80	1,033.16	3.05	1.59	11.40
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P4	0.0458	595,318.16	4,462,250.71	231.00	8.80	1,033.16	3.05	1.59	11.37
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P5	0.0458	595,335.33	4,462,231.35	231.00	8.80	1,033.16	3.05	1.59	11.35
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P6	0.0458	595,352.50	4,462,212.00	231.00	8.80	1,033.16	3.05	1.59	11.32
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P7	0.0458	595,369.67	4,462,192.65	231.00	8.80	1,033.16	3.05	1.59	11.29
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P8	0.0458	595,386.84	4,462,173.29	231.00	8.80	1,033.16	3.05	1.59	11.27
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P9	0.0458	595,404.01	4,462,153.94	231.00	8.80	1,033.16	3.05	1.59	11.24
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P10	0.0458	595,421.18	4,462,134.59	231.00	8.80	1,033.16	3.05	1.59	11.22
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P11	0.0458	595,438.35	4,462,115.24	231.00	8.80	1,033.16	3.05	1.59	11.19
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P1	0.0569	595,243.66	4,462,257.78	231.00	10.50	1,033.16	3.05	1.59	11.42
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P2	0.0569	595,260.96	4,462,238.38	231.00	10.50	1,033.16	3.05	1.59	11.40
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P3	0.0569	595,278.26	4,462,218.99	231.00	10.50	1,033.16	3.05	1.59	11.37
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P4	0.0569	595,295.55	4,462,199.59	231.00	10.50	1,033.16	3.05	1.59	11.35
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P5	0.0569	595,312.85	4,462,180.20	231.00	10.50	1,033.16	3.05	1.59	11.32
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P6	0.0569	595,330.15	4,462,160.80	231.00	10.50	1,033.16	3.05	1.59	11.29
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P7	0.0569	595,347.45	4,462,141.41	231.00	10.50	1,033.16	3.05	1.59	11.27
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P8	0.0569	595,364.74	4,462,122.01	231.00	10.50	1,033.16	3.05	1.59	11.24
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P9	0.0569	595,382.04	4,462,102.62	231.00	10.50	1,033.16	3.05	1.59	11.22
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P10	0.0569	595,399.34	4,462,083.22	231.00	10.50	1,033.16	3.05	1.59	11.19
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP1	0.0947	595,506.60	4,462,322.92	231.00	15.10	1,033.16	3.05	1.95	11.31
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP2	0.0947	595,523.30	4,462,304.46	231.00	15.10	1,033.16	3.05	1.95	11.29
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP3	0.0947	595,540.00	4,462,286.00	231.00	15.10	1,033.16	3.05	1.95	11.26
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP4	0.0947	595,556.70	4,462,267.54	231.00	15.10	1,033.16	3.05	1.95	11.24
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP5	0.0947	595,573.40	4,462,249.08	231.00	15.10	1,033.16	3.05	1.95	11.21
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP1	0.00	595,650.59	4,462,163.92	231.00	15.10	1,033.16	3.05	1.95	11.10
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP2	0.00	595,665.55	4,462,147.35	231.00	15.10	1,033.16	3.05	1.95	11.08
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP3	0.00	595,680.52	4,462,130.78	231.00	15.10	1,033.16	3.05	1.95	11.05
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP4	0.00	595,695.48	4,462,114.22	231.00	15.10	1,033.16	3.05	1.95	11.03
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP5	0.00	595,710.45	4,462,097.65	231.00	15.10	1,033.16	3.05	1.95	11.01
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP6	0.00	595,725.41	4,462,081.08	231.00	15.10	1,033.16	3.05	1.95	10.99
NRG Cheswick Main Boiler (FGD stack)	CHESWICK	3,294.21	602,375.00	4,488,256.00	231.00	168.40	326.38	12.47	8.15	34.87

Table 3-4
Air Toxics De Minimis Levels vs. Project Emissions
Invenergy LLC - Allegheny Energy Center

Air Toxic	ACHD *De Minimis* Level[a]	Project Emissions	Are Project Emissions ≥ ACHD *De Minimis* Level?[b]
Polychlorobiphenols	20 lb/yr	Not Expected to be Emitted	-
Polycyclic Organic Matter (POM)	20 lb/yr	0.71 lb/yr	No
Mercury	20 lb/yr	0.94 lb/yr	No
Dioxins and Furans	0.02 lb/yr	Not Expected to be Emitted	-
HAP Metals	20 lb/yr	15.37 lb/yr	***No***
All Other Air Toxics	0.25 tpy	14.23 tpy	***Yes***

[a] De minimis levels are from the "Policy for Air Toxics Review of Installation Permit Applications" under Allegheny County Health Department's (ACHD) Air Quality Program.

[b] If Project emissions are greater than or equal to the ACHD de minimis levels for air toxics, an air toxics analysis is required.

A summary of the annualized emissions rates from the Project is presented in Table 3-5. Only those air toxics with established risk thresholds as identified by the ACHD guidance and further summarized in Section 6.6 are included in the emissions inventory. As summarized in Table 3-4, annual mass emissions of mercury, Polycyclic Organic Matter (POM) and HAP metals are each less than the de minimis levels in accordance with the ACHD's Policy and, therefore, are not expected to significantly affect public health. Therefore, mercury, POM, and HAP metals will not be included in the air toxics modeling analysis.

3.6 PHYSICAL STACK CHARACTERISTICS

A listing of the physical stack characteristics for the emissions units that will be included in the various air quality modeling analyses is provided in Table 3-6. Information related to the physical stack characteristics includes unit location, base elevation, release height, stack temperature, stack diameter, and stack exit velocity. Base elevations are determined from Project plot plan drawings.

Table 3-5
Facility-Wide Toxics Emissions Inventory
Invenergy LLC - Allegheny Energy Center

							Emissions Unit Description	CT[a]	DB[a]	Auxilary Boiler	Dew Point Heater	Emergency Generator	Fire Water Pump
							Operating Time, hrs/yr	8,760	8,760	4,000	8,760	100	100
							Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	ULSD	ULSD
							Heat Input (HHV), Max. MMBtu/hr each unit	3,844	382	88.7	3.0	20.9	1.9
Air Toxic	**Note**	**CAS Number**	**Emissions Factors for Natural Gas-Fired Turbines**	**Emissions Factors for Natural Gas Combustion**	**Emissions Factors for Large Diesel Engines**	**Emissions Factors for Small Diesel Engines**	**Emissions Factors for Trace Metals from Distillate Oil Combustion**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**
			AP-42 Ch 3.1	**AP-42 Ch 1.4**	**AP-42 Ch 3.4**	**AP-42 Ch. 3.3**	**AP-42 Ch 1.3**						
			(lb/MMBtu)	**(lb/MMBtu)**	**(lb/MMBtu)**	**(lb/MMBtu)**	**(lb/MMBtu)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**
Polychlorobiphenols													
Not Expected to be Emitted													
Polycyclic Organic Matter (POM)													
2-Methylnaphthalene		91-57-6	-	2.29E-08	-	-	-	-	3.82E-05	4.05E-06	3.00E-07	-	-
3-Methylchloranthrene	(b)	56-49-5	-	1.71E-09	-	-	-	-	2.87E-06	3.04E-07	2.25E-08	-	-
7,12-Dimethylbenz(a)anthracene	(b)	57-97-6	-	1.52E-08	-	-	-	-	2.55E-05	2.70E-06	2.00E-07	-	-
Acenaphthene	(b)	83-32-9	-	1.71E-09	4.68E-06	1.42E-06	-	-	2.87E-06	3.04E-07	2.25E-08	2.96E-06	4.13E-07
Acenaphthylene	(b)	208-96-8	-	1.71E-09	9.23E-06	5.06E-06	-	-	2.87E-06	3.04E-07	2.25E-08	1.06E-05	1.47E-06
Anthracene	(b)	120-12-7	-	2.29E-09	1.23E-06	1.87E-06	-	-	3.82E-06	4.05E-07	3.00E-08	3.90E-06	5.44E-07
Benz(a)anthracene	(b)	56-55-3	-	1.71E-09	6.22E-07	1.68E-06	-	-	2.87E-06	3.04E-07	2.25E-08	3.51E-06	4.89E-07
Benzo(a)pyrene (PAH)	(b)	50-32-8	-	1.14E-09	2.57E-07	1.88E-07	-	-	1.91E-06	2.03E-07	1.50E-08	3.92E-07	5.47E-08
Benzo(b)fluoranthene	(b)	205-99-2	-	1.71E-09	1.11E-06	9.91E-08	-	-	2.87E-06	3.04E-07	2.25E-08	2.07E-07	2.89E-08
Benzo(g,h,i)perylene	(b)	191-24-2	-	1.14E-09	-	4.89E-07	-	-	1.91E-06	2.03E-07	1.50E-08	1.02E-06	1.42E-07
Benzo(k)fluoranthene	(b)	207-08-9	-	1.71E-09	2.18E-07	1.55E-07	-	-	2.87E-06	3.04E-07	2.25E-08	3.23E-07	4.51E-08
Chrysene	(b)	218-01-9	-	1.71E-09	1.53E-06	3.53E-07	-	-	2.87E-06	3.04E-07	2.25E-08	7.37E-07	1.03E-07
Dibenz(a,h)anthracene	(b)	53-70-3	-	1.14E-09	3.46E-07	5.83E-07	-	-	1.91E-06	2.03E-07	1.50E-08	1.22E-06	1.70E-07
Fluoranthene		206-44-0	-	2.86E-09	4.03E-06	7.61E-06	-	-	4.78E-06	5.07E-07	3.75E-08	1.59E-05	2.22E-06
Fluorene		86-73-7	-	2.67E-09	1.28E-05	2.92E-05	-	-	4.46E-06	4.73E-07	3.50E-08	6.09E-05	8.50E-06
Indeno(1,2,3-cd)pyrene	(b)	193-39-5	-	1.71E-09	4.14E-07	3.75E-07	-	-	2.87E-06	3.04E-07	2.25E-08	7.83E-07	1.09E-07
Phenanthrene		85-01-8	-	1.62E-08	4.08E-05	2.94E-05	-	-	2.71E-05	2.87E-06	2.13E-07	6.14E-05	8.56E-06
Pyrene		129-00-0	-	4.76E-09	3.71E-06	4.78E-06	-	-	7.97E-06	8.45E-07	6.26E-08	9.97E-06	1.39E-06
Total POM Emissions								**3.55E-04**					
Mercury													
Mercury		7439-97-6	-	2.48E-07	-	-	3.00E-06	-	4.14E-04	4.39E-05	3.25E-06	6.26E-06	8.73E-07
Total Mercury Emissions								**4.69E-04**					
Dioxins and Furans													
Not Expected to be Emitted													
HAP Metals													
Arsenic		7440-38-2	-	1.90E-07	-	-	4.00E-06	-	3.19E-04	3.38E-05	2.50E-06	8.35E-06	1.16E-06
Beryllium	(b)	7440-41-7	-	1.14E-08	-	-	3.00E-06	-	1.91E-05	2.03E-06	1.50E-07	6.26E-06	8.73E-07
Cadmium		7440-43-9	-	1.05E-06	-	-	3.00E-06	-	1.75E-03	1.86E-04	1.38E-05	6.26E-06	8.73E-07
Lead	(e)	7439-92-1	-	4.76E-07	-	-	9.00E-06	-	7.97E-04	8.45E-05	6.26E-06	1.88E-05	2.62E-06
Manganese		7439-96-5	-	3.62E-07	-	-	6.00E-06	-	6.06E-04	6.42E-05	4.76E-06	1.25E-05	1.75E-06
Nickel		7440-02-0	-	2.00E-06	-	-	3.00E-06	-	3.35E-03	3.55E-04	2.63E-05	6.26E-06	8.73E-07
Total HAP Metal Emissions								**7.68E-03**					

Table 3-5
Facility-Wide Toxics Emissions Inventory
Invenergy LLC - Allegheny Energy Center

							Emissions Unit Description	CT[a]	DB[a]	Auxilary Boiler	Dew Point Heater	Emergency Generator	Fire Water Pump
							Operating Time, hrs/yr	8,760	8,760	4,000	8,760	100	100
							Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	ULSD	ULSD
							Heat Input (HHV), Max. MMBtu/hr each unit	3,844	382	88.7	3.0	20.9	1.9
Air Toxic	**Note**	**CAS Number**	**Emissions Factors for Natural Gas-Fired Turbines**	**Emissions Factors for Natural Gas Combustion**	**Emissions Factors for Large Diesel Engines**	**Emissions Factors for Small Diesel Engines**	**Emissions Factors for Trace Metals from Distillate Oil Combustion**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**	**Annual Emissions**
			AP-42 Ch 3.1	**AP-42 Ch 1.4**	**AP-42 Ch 3.4**	**AP-42 Ch. 3.3**	**AP-42 Ch 1.3**						
			(lb/MMBtu)	**(lb/MMBtu)**	**(lb/MMBtu)**	**(lb/MMBtu)**	**(lb/MMBtu)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**	**(tpy)**
All Other Air Toxics													
1,3-Butadiene	(b)	106-99-0	4.30E-07	-	-	3.91E-05	-	7.24E-03	-	-	-	8.16E-05	1.14E-05
Acetaldehyde		75-07-0	4.00E-05	-	2.52E-05	7.67E-04	-	0.67	-	-	-	1.60E-03	2.23E-04
Acrolein	(b)	107-02-8	6.40E-06	-	7.88E-06	9.25E-05	-	0.11	-	-	-	1.93E-04	2.69E-05
Benzene		71-43-2	1.20E-05	2.00E-06	7.76E-04	9.33E-04	-	0.20	3.35E-03	3.55E-04	2.63E-05	1.95E-03	2.72E-04
Butane		106-97-8	-	2.00E-03	-	-	-	-	3.35	0.35	0.03	-	-
Cobalt		7440-48-4	-	8.00E-08	-	-	-	-	1.34E-04	1.42E-05	1.05E-06	-	-
Ethylbenzene		100-41-4	3.20E-05	-	-	-	-	0.54	-	-	-	-	-
Formaldehyde	(c)	50-00-0	2.76E-04	2.76E-04	7.89E-05	1.18E-03	-	4.65	0.46	0.05	3.63E-03	2.46E-03	3.44E-04
Hexane (n)	(d)	110-54-3	-	1.24E-06	-	-	-	-	2.07E-03	2.20E-04	1.63E-05	-	-
Naphthalene		91-20-3	1.30E-06	5.81E-07	1.30E-04	8.48E-05	-	0.02	9.72E-04	1.03E-04	7.63E-06	1.77E-04	2.47E-05
Propylene Oxide	(b)	75-56-9	2.90E-05	-	-	-	-	0.49	-	-	-	-	-
Toluene		108-88-3	1.30E-04	3.24E-06	2.81E-04	4.09E-04	-	2.19	5.42E-03	5.74E-04	4.25E-05	8.53E-04	1.19E-04
Vanadium		7440-62-2	-	2.19E-06	-	-	-	-	3.67E-03	3.89E-04	2.88E-05	-	-
Xylenes		1330-20-7	6.40E-05	-	1.93E-04	2.85E-04	-	1.08	-	-	-	5.95E-04	8.30E-05
Total Other Air Toxics Emissions								**14.23**					

(a) The combustion turbine and the duct burners vent to a common HRSG stack.

(b) Emissions factors are based on method detection limits from AP-24 Chapter 1.4, Chapter 3.1, Chapter 3.3, or Chapter 3.4.

(c) Formaldehyde standard in 40 CFR Part 63, Subpart YYYY (0.091 parts per million, volumetric dry [ppmvd] @ 15% oxygen [O2]).

(d) The AP-42 emissions factor for hexane from natural gas combustion (AP-42 Chapter 1.4 Table 1.4-3 (7/98)) has been designated as poor (i.e. "E" rating). This hexane emissions factor is considered unreasonably high. Therefore, a more realistic hexane emissions factor is being used. The hexane emissions factor is provided in Ventura County Air Pollution Control District document AB2588 AB 2588 - Combustion Emission Factors.

(e) Lead emissions factor is from AP-42, converted from lb/MMscf to lb/MMBtu.

Table 3-6
Summary of Physical Stack Characteristics
Invenergy LLC - Allegheny Energy Center

Source	UTM Easting	UTM Northing	Base Elevation	Stack Height	Stack Temperature	Stack Velocity	Stack Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
Auxiliary Boiler	602,449.2	4,453,431.3	309.40	10.67	405.37	9.28	1.2
Dew Point Heater	602,247.0	4,453,313.1	309.40	7.62	622.04	6.35	0.5
Emergency Generator	602,419.7	4,453,445.1	309.40	4.57	753.15	46.29	0.5
Fire Water Pump	602,324.0	4,453,497.4	309.40	3.81	789.26	36.22	0.2
HRSG[a]	602,441.6	4,453,386.8	309.40	54.86	Various[b]	Various[b]	6.7

[a] The combustion turbine and the duct burners vent to a common HRSG stack.

[b] To be determined based on Worst Case Load Analysis.

4. AIR QUALITY MODELING APPROACH AND TECHNICAL INFORMATION

This section of the air quality modeling protocol presents the technical approach that will be used to demonstrate compliance with the NAAQS and PSD increments. The air dispersion model selection is discussed as well as the options that will be used in the model. Supporting information such as land use determinations, building downwash analyses, meteorological data, and terrain data, is also presented in this section. The guidance provided in 40 CFR Part 51 Appendix W "Guideline on Air Quality Models" (U.S. EPA 2017) will be used to conduct the air quality modeling analyses. Additional guidance provided by the ACHD will be incorporated as needed.

4.1 AIR DISPERSION MODEL SELECTION

The AERMOD (**AER**MIC **MOD**el) air dispersion model will be used to predict ambient air concentrations from the AEC. AERMOD is a 40 CFR Part 51 Appendix W air dispersion model approved for regulatory modeling applications. The current regulatory version of AERMOD is 18081. Invenergy will utilize U.S. EPA's version of AERMOD and will not use a proprietary version of AERMOD.

The AERMOD modeling system consists of two pre-processors and the dispersion model. AERMET (Version 18081) is the meteorological pre-processor component and AERMAP (Version 18081) is the terrain pre-processor component. The AERMAP pre-processor characterizes the surrounding terrain and generates receptor elevations. The AERMET pre-processor is used to generate an hourly profile of the atmosphere and uses a pre-processor, AERSURFACE (Version 13016), to process land use data for determining micrometeorological variables that are inputs to AERMET.

The AERMOD air dispersion model has various user selectable options that must be considered. U.S. EPA has recommended that certain options be selected when performing air quality modeling studies for regulatory purposes. The following regulatory default options will be used in the AERMOD air quality modeling study:

- Stack-Tip Downwash (default)
- Elevated Terrain Effects (default)
- Calms Processing (default)
- No Exponential Decay for Rural Mode (default)
- Missing Data Processing
- Ambient Ratio Method 2 (ARM2, default)

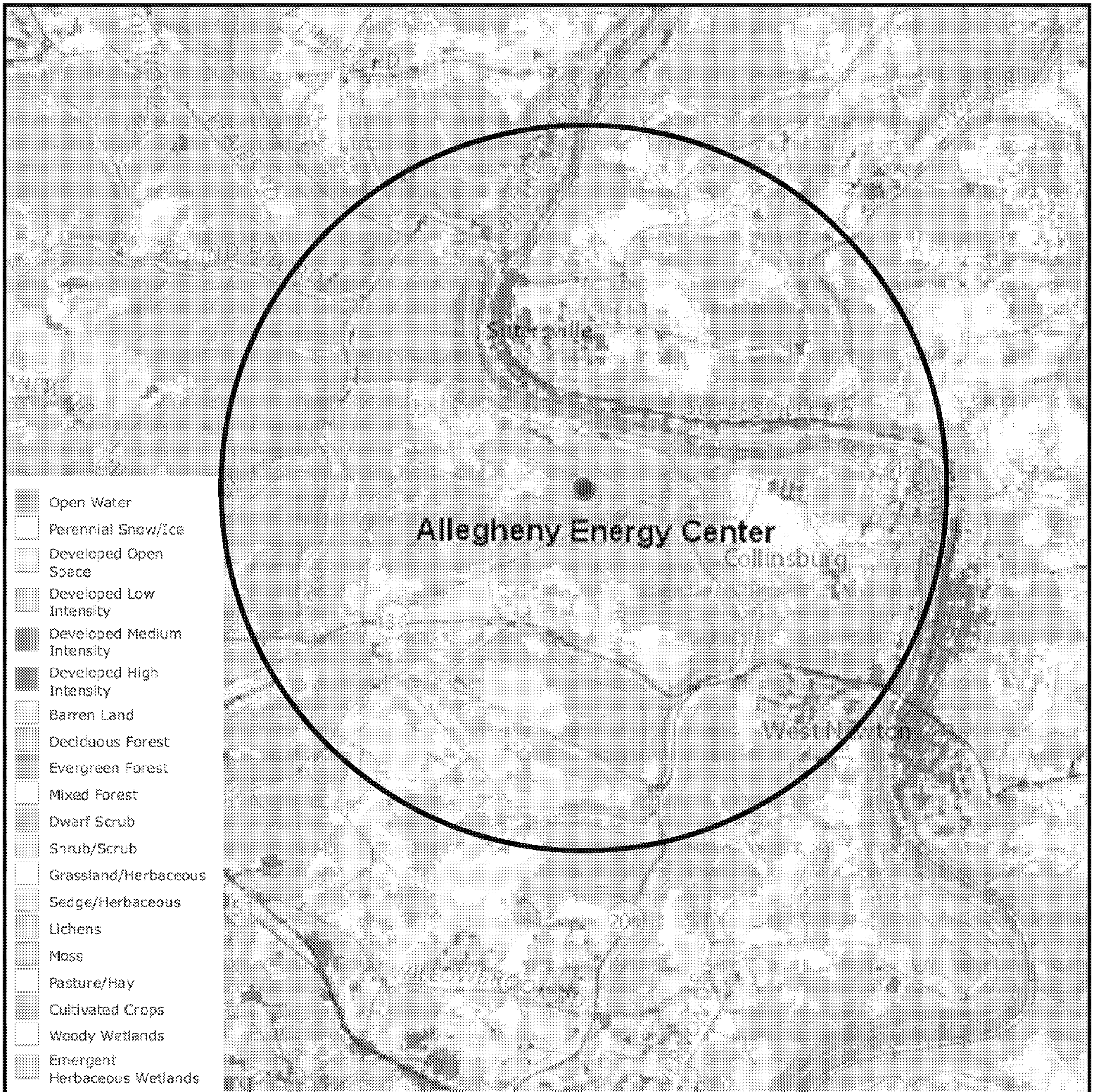
4.2 LAND USE ANALYSIS

A land use analysis for the area surrounding the AEC was prepared based on 2011 USGS National Land Cover Data (NLCD 2011) for the area. Following U.S. EPA guidance (U.S. EPA 2017), the land use designations were based on the land use classification scheme developed by Auer (Auer 1978). The Auer land use classifications designate developed high intensity land use (NLCD2011 Category 24) and developed medium intensity land use (NLCD2011 Category 23) as urban land use while the remaining NLCD2011 categories are considered to be rural land use. If more than 50% of the land use within a 3-km radius of the AEC is rural, then a rural designation should be used in the air dispersion model.

To perform the land use analysis, geographical information system (GIS) software was used to review the various land use types contained in the NLCD2011 electronic land use dataset. Based on the GIS summary, the land use within a 3-km radius of the AEC is rural. Review of the NLCD2011 land use within a 3-km radius indicates that at least 50% is categized as rural. Therefore, the urban option was not selected in the AERMOD air dispersion model. The 3-km radius land use summary for the area surrounding the AEC is shown in Figure 4-1.

4.3 RECEPTOR GRID

The receptor grid for the AERMOD analysis will cover a 20 km square area that is centered on the proposed AEC. Receptors will be referenced to the UTM coordinate system, Zone 17, and using NAD 1983 datum. Rectangular coordinates will be used to identify each receptor location. The rectangular receptor grid will be centered on the AEC and will have the following grid spacing:



3 km radius from AEC

N

0 1.5 3
kilometers

Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

Figure 4-1
Proposed Allegheny Energy Center
3 km Land Use Analysis

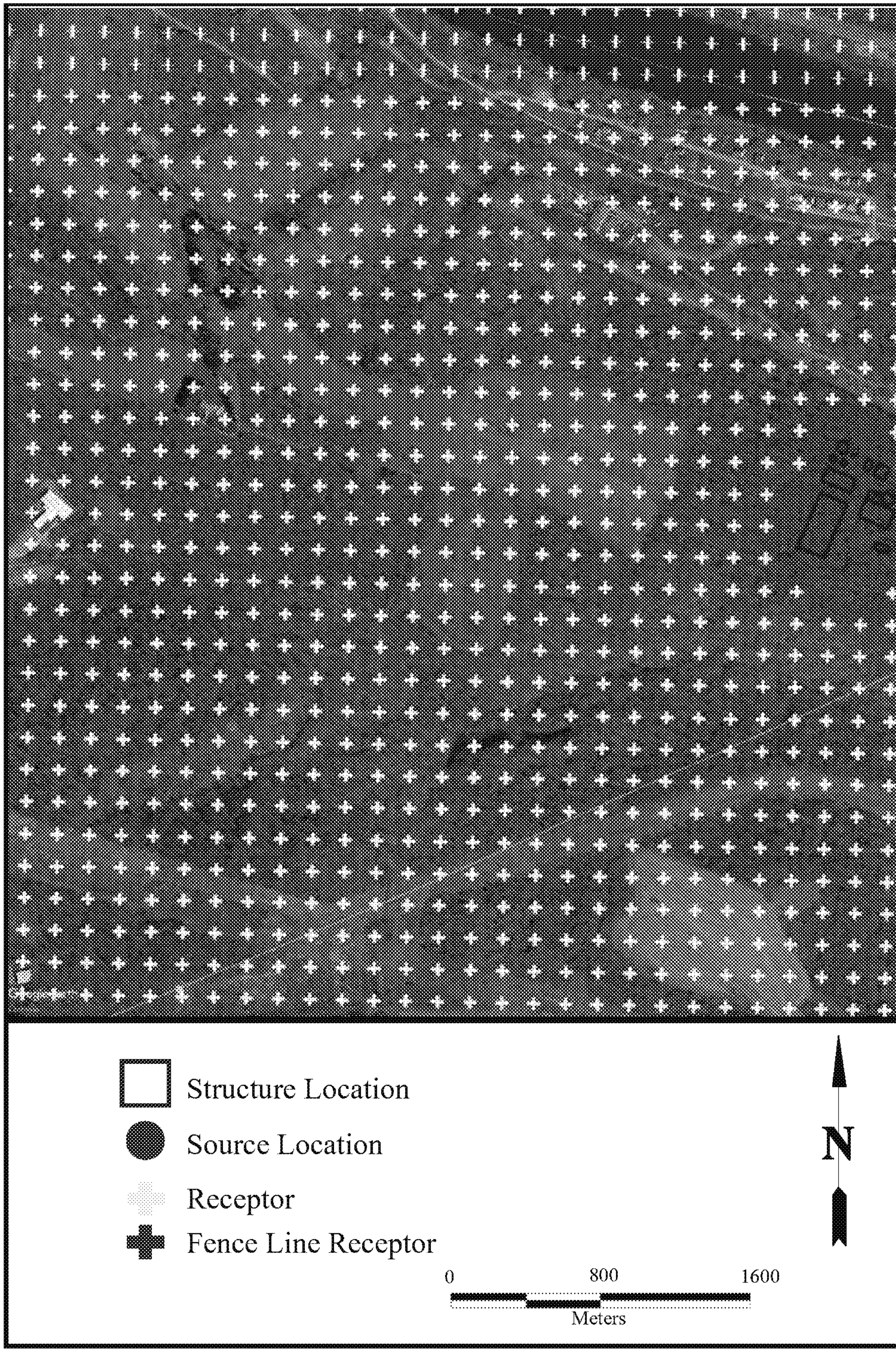
- 50 meters out to ± 2 km
- 100 meters out to ± 5 km
- 500 meters out to ± 10 km

In addition to the main rectangular coordinate receptor grid, fence line receptors will be used in the air quality modeling analysis. The fence line represents the location of fencing on the AEC property, which will restrict access to the public and therefore is considered the ambient air boundary. The fence line receptors will be spaced approximately every 10 m. Fence line receptor elevations will be based on the proposed plot plan for the proposed AEC, where available. Otherwise, receptor elevations will be developed by AERMAP as described in the next paragraph. A plot of the inner portion of the receptor grid is shown in Figure 4-2.

Terrain elevations will be assigned to the receptors. The AERMAP terrain pre-processor (Version 18081) and USGS 1/3 arc-second National Elevation Dataset (NED) files will be used to determine representative terrain elevations for all of the receptors. The horizontal resolution of the NED data is every 10 m. Additional receptors may be added to the original receptor grid if a peak concentration is predicted to occur in an area where the receptor grid spacing is greater than 50 m. A refined 50 m spacing grid will be centered on the peak predicted receptor and will extend out 500 m to confirm that the overall maximum concentration is determined.

4.4 METEOROLOGICAL DATA

The entire processed meteorological dataset was provided to Invenergy by ACHD in October 2015 and confirmed to be utilized for this project by ACHD in January 2019. The meteorological data that will be used for the air quality modeling study consists of five years of local data collected from January 1, 2010 through December 31, 2014 at the Liberty meteorological station (Station ID 00064). The meteorological data were processed with a previous version of AERMET (15181), however, no updates to AERMET have been made that will significantly affect the modeled concentrations. The Liberty meteorological station is located at South Allegheny High School, about 12 km north-northwest of the Project Site. Upper air and cloud cover data from Pittsburgh, Pennsylvania National Weather Service (NWS) station (Station ID 94823 and KPIT) were



Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

Figure 4-2
Proposed Allegheny Energy Center
Inner Receptor Grid

combined with the Liberty data to form a complete dataset. The Pittsburgh, Pennsylvania NWS station is located approximately 47 km from the Project Site.

4.5 METEOROLOGICAL DATA REPRESENTATIVENESS

An evaluation of the topography and geography surrounding the Liberty meteorological station to the topography and geography surrounding the Project Site shows that the Liberty meteorological station is representative of the meteorological conditions at the Project Site. Both sites can be characterized as being located in generally rolling terrain surrounded by a mix of forest and farmland interspersed with single family residential properties. Invenergy compared the locations of the available meteorological data around the Project Site and determined that the Liberty meteorological station was the closest. The Liberty meteorological station is located only 12 km north-northwest of the Project Site. The next closest meteorological monitoring site is the KPIT NWS station which is located 47 km from the Project Site. Based on the geographical proximity of the Liberty meteorological station to the Project Site, and guidance from ACHD, the Liberty meteorological data is considered representative of meteorological conditions at the Project Site, and, therefore, will be used in the air quality modeling analyses. A figure identifying the Project Site, meteorological station and the topography and geography between the two sites is provided in Figure 4-3.

4.6 GEP STACK HEIGHT ANALYSIS

The stacks at the proposed AEC will be analyzed for the potential influence of building downwash on emissions and resulting ambient concentrations. Guidance contained in the U.S. EPA "Guideline for Determination of Good Engineering Practice (GEP) Stack Height (Revised)" (U.S. EPA 1985) and the U.S. EPA Building Profile Input Program (BPIP) for PRIME (BPIPPRM, 04274) will be followed. To perform the building downwash analysis, a facility plot plan showing the proposed AEC buildings, structures, and stacks will be digitized using GIS software. Buildings with multiple tiers are digitized as a single building with multiple tiers rather than multiple buildings with a single tier. Using the approach that incorporates building tiers preserves the actual representation of the physical characteristic of the buildings. The results of the GIS digitization of

0 2 4
kilometers

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Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

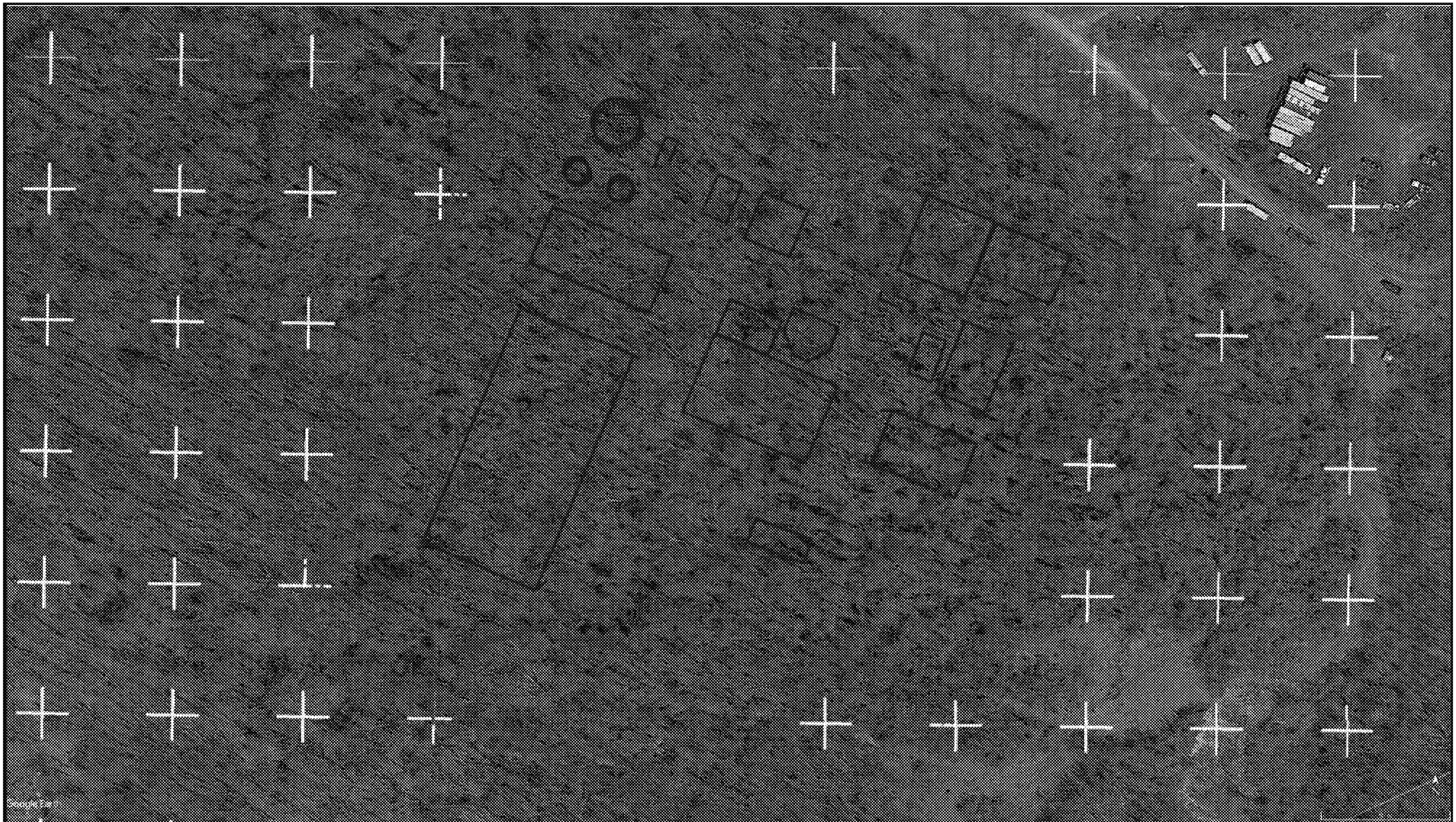
Figure 4-3
Regional Map of Meteorological Station and the Proposed Allegheny Energy Center

the AEC facility are presented in Figure 4-4. It should be noted the facility layout is preliminary and is subject to change before the Installation Permit application is submitted.

4.7 BACKGROUND AMBIENT AIR DATA

Ambient background 1-hour NO_2 concentrations must be considered for the NAAQS demonstration. The ambient background concentration will be added to the cumulative modeled concentration resulting from the Project and local sources. Invenergy followed guidance contained in U.S. EPA's March 1, 2011 memorandum which outlines a "Tier 2" approach for including background ambient NO_2 concentrations. The "Tier 2" approach is also further justified in U.S. EPA's September 30, 2014 memorandum. The "Tier 2" approach incorporates background concentrations by season and hour-of-day. Specifically, the 3rd highest monitored NO_2 concentration for each hour (1-24) from each day over one season from the last three years was calculated and the appropriate value will be added to the modeled concentration. A summary of the monitored NO_2 seasonal diurnal 3rd highest average concentrations during 2015 through 2017 from the Charleroi, PA monitor is presented in Table 4-1.

Invenergy proposes that the ambient NO_2 measurements from the Charleroi, PA monitoring site are representative of the background concentrations at AEC for the NAAQS demonstration. The basis for this proposal follows. The Charleroi, PA NO_2 ambient monitor in the City of Charleroi is located about 12 km southwest of the proposed AEC in the City of Charleroi. The City of Charleroi is a more urban setting than the rural location of the proposed AEC. The location of the Charleroi, PA ambient monitor in an urban setting will result in higher background NO_2 concentrations due to the proximity of industrial and mobile sources of NO_2 emissions to the ambient monitor. Therefore, the use of the Charleroi, PA ambient NO_2 monitor is a representative and conservative approach for establishing background data for AEC.



Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

Figure 4-3
Proposed Allegheny Energy Center
Building Downwash Analysis

Table 4-1
Summary of Diurnal Seasonal Average NO_2 Concentrations
Invenergy LLC - Allegheny Energy Center

Hour	NO_2 Concentration (ppb) [a,b]			
	Winter	Spring	Summer	Autumn
1	30.0	29.3	18.3	23.3
2	28.7	28.0	15.0	21.0
3	29.0	29.3	14.0	20.7
4	28.7	27.7	13.3	19.3
5	28.0	27.3	15.0	20.0
6	29.3	27.0	15.3	20.3
7	30.3	29.3	16.0	21.7
8	32.7	28.0	15.7	23.0
9	32.0	28.0	11.7	22.0
10	32.3	19.7	8.7	24.0
11	28.7	12.3	7.3	19.7
12	27.0	14.3	7.7	13.7
13	22.0	13.3	7.0	14.0
14	19.7	10.0	7.0	18.0
15	17.3	9.7	6.7	12.3
16	18.3	10.0	7.7	14.0
17	23.7	10.7	7.7	15.0
18	24.3	14.7	8.3	16.0
19	26.0	17.3	8.3	19.7
20	28.0	22.3	9.3	22.7
21	27.7	23.0	10.7	23.3
22	29.0	27.0	14.3	23.7
23	29.0	26.0	17.3	22.3
24	29.3	28.7	17.0	21.7

[a] NO_2 concentrations were measured at the Charleroi, PA ambient air monitor (AirData Monitoring Site ID: 42-125-0005) from January 1, 2015 to December 31, 2017.
[b] 1 part per billion (ppb) of NO_2 = 1.88 micrograms per cubic meter ($\mu g/m^3$).

4.8 EVALUATION OF OZONE AND PM2.5 SECONDARY FORMATION PRECURSOR EMISSIONS

The 2017 amendments to 40 CFR Part 51 Appendix W require an evaluation of the potential for ozone formulation based on the emissions rates of VOCs and NO_X, both of which are precursor pollutants for ozone. In addition, NO_X is a precursor pollutant for the formation of $PM_{2.5}$. The proposed project will be major for NO_X emissions; and therefore, a discussion of the potential for NO_X and VOC emissions to act as a precursor pollutant is included. Although emissions of SO_2 are neither major nor significant, SO_2 is a precursor pollutant for $PM_{2.5}$ and was included in the precursor analysis.

To evaluate the impact of precursor emissions rates on ozone formation, 40 CFR Part 51 Appendix W discusses the option to use Modeled Emissions Rates for Precursors (MERPs). U.S. EPA released draft guidance, in December 2016 (U.S. EPA 2016), that details methods to use MERPs as a Tier 1 approach to demonstrate the potential for ozone formation from precursor emissions. Section 7 of the draft guidance includes examples of a MERP Tier 1 demonstration that is based on the U.S. EPA modeling assessments of precursors from representative photochemical grid modeling. The modeling assessments cover several example PSD permit scenarios.

The projected VOC emissions from the proposed project are preliminarily calculated to be 73.32 tpy, which is above the NNSR threshold for being a major source. The projected NO_X emissions from the proposed project is preliminarily calculated to be 143.50 tpy, which is above the PSD and NNSR threshold for being a major source. From Table 7.1 of the U.S. EPA MERP guidance document, Eastern U.S. MERP values are 814 tpy for VOC and 169 tpy for NO_X.

The projected VOC emissions of 73.32 tpy are well below the MERP value of 814 tpy for the VOC precursor, and the NO_X emissions of 143.50 tpy are also below the MERP value of 169 tpy for the NO_X precursor. Using Equation 4-1, an assessment of NO_X and VOC precursor emissions was evaluated for ozone:

$$\frac{EMIS\_NOx}{MERP_{NOx}} + \frac{EMIS_{VOC}}{MERP_{VOC}} < 1 (Equation\ 4-1)$$

$$\frac{143.50 \text{ tpy}}{169 \text{ tpy}} + \frac{73.32 \text{ tpy}}{814 \text{ tpy}} = 0.94 < 1$$

The cumulative air quality impacts of ozone precursor emissions from the proposed project are not expected to increase the critical air quality threshold for ozone, as the additive secondary impacts on 8-hour daily ozone concentrations are calculated to be less than 1 part per billion (ppb). A cumulative analysis of ozone precursor emissions is not required for secondary ozone formation.

To evaluate the $PM_{2.5}$ SIL for secondary formation, the equation from the December 2016 draft MERP guidance will be used. For 24-hour $PM_{2.5}$, the NO_X MERP is 2,467 tpy and the SO_2 MERP is 675 tpy. Using Equation 4-2, an assessment of NO_X and SO_2 precursor emissions will be evaluated for $PM_{2.5}$:

$$\frac{EMIS\_PM2.5}{SER\_PM2.5} + \frac{EMIS_{NOx}}{MERP_{NOx}} + \frac{EMIS_{SO2}}{MERP_{SO2}} < 1 \; (Equation\ 4-2)$$

If the 24-hour $PM_{2.5}$ evaluation for secondary formation is greater than 1, SIL modeling with AERMOD will be required for the to further evaluate the SIL.

If modeling is required to evaluate the $PM_{2.5}$ SIL, Equation 4-3 will be used to further evaluate the modeled concentrations:

$$\frac{HMC_{PM2.5}}{SIL_{PM2.5}} + \frac{EMIS_{SO2}}{MERP_{SO2}} + \frac{EMIS_{NOx}}{MERP_{NOx}} < 1 \; (Equation\ 4-3)$$

To evaluate the annual $PM_{2.5}$ SIL for secondary formation, the same Equation 4-4 will be used. For annual $PM_{2.5}$, the NO_X MERP is 10,037 tpy, and the SO_2 MERP is 4,013 tpy. Using Equation 4-4, an assessment of NO_X and SO_2 precursor emissions will be evaluated for annual $PM_{2.5}$:

$$\frac{EMIS\_PM2.5}{SER\_PM2.5} + \frac{EMIS_{NOx}}{MERP_{NOx}} + \frac{EMIS_{SO2}}{MERP_{SO2}} < 1 \; (Equation\ 4-4)$$

The Class I $PM_{2.5}$ SILs will also be evaluated for secondary formation of $PM_{2.5}$ from precursors using the same procedures outlined above.

5. CLASS I ANALYSES

There are four Class I areas located within 300 km of the proposed AEC. Therefore, an analysis of Class I AQRV and Class I PSD increments is required. A figure showing the distance and direction to the Class I areas listed below is provided in Figure 5-1:

- Otter Creek Wilderness Area –137 km
- Dolly Sods Wilderness Area –137 km
- Shenandoah National Park –236 km
- James River Face Wilderness Area –295 km

The following subsections summarize how the Class I AQRVs and PSD increments will be evaluated.

5.1 CLASS I AQRV ANALYSIS SUMMARY

Invenergy will submit a "Request for Applicability of Class I Area Modeling Analysis" to the U.S. Forest Service (USFS) (which oversees wilderness areas), and the National Park Service (NPS) (which oversees national parks). Correspondence between Invenergy and the Federal Land Managers (FLM) will be provided to ACHD as part of the proposed AEC Installation Permit application. Invenergy will utilize the "Q/d" approach to evaluate whether a full Class I AQRV evaluation will be required for the proposed project. Using this approach, "Q" is equal to the annualized maximum 24-hour emissions rate of PM_{10}, SO_2, NO_X, and sulfuric acid mist (SAM) in tpy, and "d" is the distance from the facility to the Class I area in km (e.g., Otter Creek Wilderness Area – 137 km). It is anticipated that the resulting Q/d ratio will be less than 10. Once the emissions calculations are finalized, all Q/d values for each Class I area will be provided in a table in the final installation permit application. If the Q/d ratio is less than the screening threshold of 10 set by the FLMs in the most recent FLM AQRV Workgroup (FLAG) document, Invenergy will propose that no Class I AQRV evaluation be required as part of the proposed project. If the Q/d ratio is greater than 10, or an FLM requests that an AQRV analysis be conducted, the air quality modeling protocol will be updated to include Class I air quality modeling procedures.

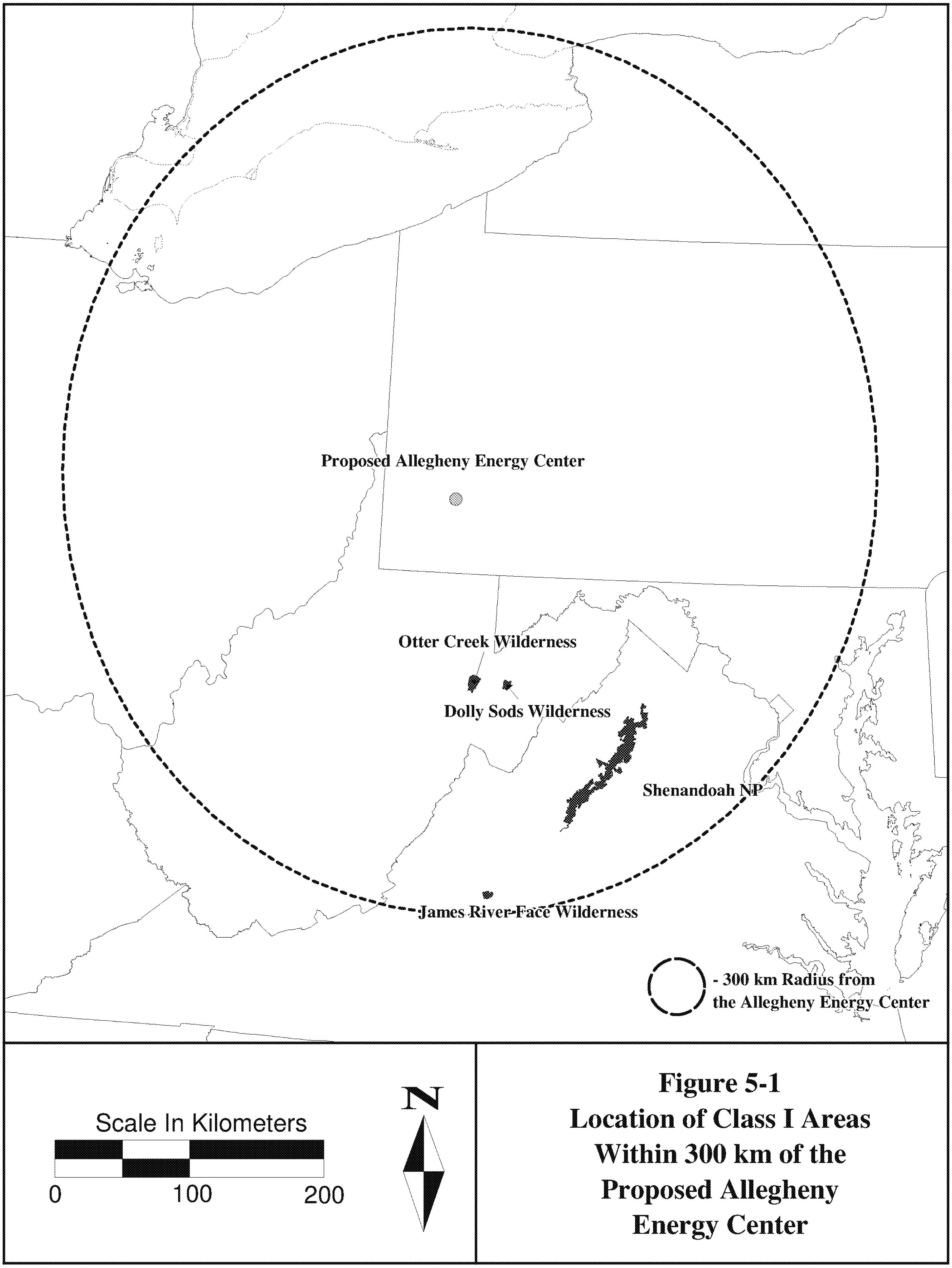


Figure 5-1
Location of Class I Areas Within 300 km of the Proposed Allegheny Energy Center

5.2 CLASS I PSD SIL ANALYSIS SUMMARY

To evaluate the $PM_{2.5}$, PM_{10} and NO_2 Class I PSD increments, Invenergy will conduct an air quality modeling screening analysis that will utilize AERMOD to predict project-related concentrations at the Class I areas within 300 km for comparison to the Class I SILs. Invenergy will develop a receptor grid 50 km from the proposed AEC, which is the maximum distance that the AERMOD air dispersion model is recommended for use. The receptor grid will consist of a single circle of receptors (with a downwind distance/radius of 50 km) and spacing of 500 m between each receptor. Since the AERMOD air dispersion model is a steady-state model, predicting concentrations at 50 km from the AEC will be a conservative assessment of concentrations at each Class I area since the Class I areas are more than twice the distance modeled and will experience additional dispersion over the additional distance. Should a less conservative approach be necessary Invenergy will discuss alternative options with ACHD before submitting the Installation Permit application.

6. PRESENTATION OF AIR QUALITY MODELING RESULTS

This section of the air quality modeling protocol discusses how the results from the air quality modeling analyses will be evaluated. The various analyses include the worst-case load analysis, SILs, NAAQS, Class II and Class I PSD increments, and air toxics. A summary of the NAAQS, Class I and II increments, Class I and II SILs, and significant monitoring concentrations (SMCs) is provided in Table 6-1. The applicable forms of the monitored and modeled values for these standards and thresholds are summarized in Table 6-2.

6.1 WORST-CASE LOAD ANALYSIS

A worst-case load analysis will be performed to define the worst-case condition for the turbines. The worst-case load analysis will be performed for each of the load conditions: full load with and without duct firing, partial loads (approximately 40-50%), and startup/shutdown. Once the worst-case condition emissions rate for each pollutant is determined, the worst-case condition and the design load for the turbine will be used for the Class II SIL, multi-source, and Class I SIL analyses summarized below. The design load will be characterized as full load and the annual potential-to-emit emissions rate for each pollutant.

6.2 CLASS II SIGNIFICANT ANALYSIS

The air quality modeling analysis will initially determine if emissions from the proposed project result in CO, NO_2, $PM_{2.5}$, and PM_{10} concentrations that are greater than the Class II PSD SILs and SMCs summarized in Table 6-1. The modeled concentrations for the five years of meteorological data will be reviewed. If the significant analyses determine that the modeled concentrations are less than the Class II significant concentrations, then no further air quality modeling analyses will be performed. If the modeled concentrations are above the Class II SILs, then a significant impact area will be defined and additional air quality modeling analyses will be performed.

Table 6-1
Summary of NAAQS, Class II Increments, Class II SILs, and SMCs ($\mu g/m^3$)
Invenergy LLC - Allegheny Energy Center

Pollutant	Averaging Period	NAAQS[a]	Class II Increment Standards	Class II SIL[b]	SMC
CO	1-Hour	40,000[c]	-	2,000	
	8-Hour	10,000[c]	-	500	575
NO_2	1-Hour	188.0[d]	-	7.5[e]	-
	Annual	100[f],[g]	25[g]	1	14
$PM_{2.5}$	24-Hour	35[f],[h]	9[c]	1.2	[i]
	Annual	12.0[c] / 15.0[j],[k]	4[g]	0.2	-
PM_{10}	24-Hour	150[f],[l]	30[f]	5	10
	Annual	[m]	17[g]	1	-

[a] Primary standard unless otherwise noted.

[b] A major source or modification will be considered to cause or contribute to a violation of the NAAQS when such a source or modification would, at a minimum, exceed the significance level at any location that does not or would not meet applicable national standard [40 CFR 51.165(b)(2)].

[c] Not to be exceeded more than once per year.

[d] 98th percentile of daily maximum 1-hour concentrations for each year, averaged over three years.

[e] Interim SIL recommended by U.S. EPA (memorandum dated June 29, 2010, from Stephen D. Page, "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program") - adopted by PADEP on December 1, 2010.

[f] Secondary standard has same value as primary standard.

[g] Arithmetic mean concentration averaged over a calendar year.

[h] 98th percentile of 24-hour concentrations for each year, averaged over three years.

[i] On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated the parts of two PSD rules establishing a PM2.5 SMC, finding that the U.S. EPA was precluded from using the PM2.5 SMCs to exempt permit applicants from the statutory requirement to compile preconstruction monitoring data.

[j] Secondary Standard.

[k] Arithmetic mean concentration for each year, averaged over three years.

[l] Not to be exceeded more than once per year on average over three years.

[m] Revocation effective December 18, 2006.

Note: Only the pollutants subject to PSD review for this project are presented in this table.

Table 6-2
Forms for Modeled Values for Use In Comparison With NAAQS, Increment Standards, SILs and SMCs - Based On Applicable Rules and Guidance
Invenergy LLC - Allegheny Energy Center

Pollutant	Averaging Period	Cumulative Analysis[a]	Class II Increment	Class II SIL	SMC
CO	1-Hour	Highest 2nd high value over five years of NWS data[b]	-	Highest 1st high value over five years of NWS data[b]	-
	8-Hour	Highest 2nd high value over five years of NWS data[b]	-	Highest 1st high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[c]
NO_2	1-Hour	98th percentile of the annual distribution of daily maximum 1-hour values averaged across five years of NWS data	-	Maximum of the 5-year averages of the max. modeled 1-hour values for each year at each receptor, based on five years of NWS data	-
	Annual	Highest 1st high value over five years of NWS data [b]	Highest 1st high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[b]
$PM_{2.5}$	24-Hour	5-year average of the 98th-percentile of 24-hr values, based on five years of NWS data	Highest 2nd high value over five years of NWS data[b],[c]	Form of SIL for the 24-hour NAAQS is the maximum of the 5-year averages of the max. 24-hour average values for each year at each receptor, based on five years of NWS data	
	Annual	Maximum average of the annual concentrations, based on five years of NWS data[f]	Highest 1st high value over five years of NWS data[b],[c]	Form of SIL for the annual NAAQS is the maximum average of the annual concentrations over five years of NWS data	-
PM_{10}	24-Hour	6th high value over five years of NWS data	Highest 2nd high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[b]
	Annual	-	Highest 1st high value over five years of NWS data[b]	Highest 1st high value over five years of NWS data[b]	-

[a] Combine modeled results from cumulative analysis with appropriate ambient background concentration to compare to NAAQS.

[b] Highest of the 1st or 2nd highest values by receptor over all receptors for the appropriate averaging period for each individual year the meteorological data covers.

[c] U. S. EPA memorandum "Guidance for PM-2.5 Permit Modeling", dated May 20, 2014, recommends comparing impacts from new or modified source directly to increment standard if source represents first PSD application in the area after trigger date.

Note: Only the pollutants subject to PSD review for this project are presented in this table.

It is anticipated that the proposed AEC will result in modeled concentrations below the SILs for CO, $PM_{2.5}$, PM_{10}, and annual NO_2. Therefore, in order to justify the use of the SILs to preclude the need for NAAQS and PSD increment analyses, a "headroom" test was conducted using ambient monitoring data to ensure that NO_2 (annual), CO (1-hr), CO (8-hr), $PM_{2.5}$ (24-hr), $PM_{2.5}$ (annual), and PM_{10} (24-hr) modeled concentrations below the SILs will not contribute to an exceedance of the NAAQS. The ambient NO_2 data is from the Charleroi, PA monitor, the ambient CO data is from the Pittsburgh, PA monitor, and the $PM_{2.5}$/PM_{10} data is from the Clairton, PA monitor. A summary of the 2015 to 2017 ambient monitoring data for NO_2 (annual), CO (1-hr), CO (8-hr), $PM_{2.5}$ (24-hr), $PM_{2.5}$ (annual), and PM_{10} (24-hr) ambient monitoring data is provided in Table 6-3. As shown in Table 6-3, modeled concentrations that are below the respective SIL will not cause an increase in ambient concentrations that has the potential to exceed the respective NAAQS. Therefore, the use of the SILs is appropriate for justifying that no NO_2 (annual), CO (1-hr), CO (8-hr), $PM_{2.5}$ (24-hr), $PM_{2.5}$ (annual), nor PM_{10} (24-hr) multi-source air quality modeling analyses will be required for these pollutants and averaging periods.

6.3 MULTI-SOURCE AIR QUALITY MODELING ANALYSIS

If the significant analysis determines that the ambient concentrations resulting from the proposed AEC emissions are above the Class II SILs, then a multi-source air quality modeling analysis will be conducted to demonstrate compliance with the NAAQS and PSD increments, as appropriate. As stated previously, it is anticipated that NO_X emissions will result in NO_2 concentrations greater than the 1-hour NO_2 Class II SIL. Therefore, the multi-source air quality modeling analysis will include all of the sources at the proposed AEC that emit NO_2 as well as other local NO_X emissions sources. Only those receptors that result in predicted concentrations above the Class II SILs will be included in the multi-source air quality modeling analyses.

The multi-source air quality modeling analysis will be used to demonstrate compliance with the 1-hour NO_2 NAAQS as summarized in Table 6-1. For the NAAQS demonstration, representative background ambient air concentrations will be added to the modeled concentrations. A discussion of background ambient air concentrations is provided in Section 4.7 of this protocol.

Table 6-3
Ambient Monitor Summary
Invenergy, LLC - Allegheny Energy Center

Pollutant	Monitor				Averaging Period	Form	2015	2016	2017	Average	Maximum	NAAQS	Difference	Class II SILs
	State	County	City	ID			µg/m³							
CO	PA	Allegheny	Pittsburgh	42-003-0008	1-Hour	High Second-High	1,489.3	1,603.8	2,062.1	**N/A**	**2,062.1**	**40,000**	**37,938**	**2,000**
					8-Hour	High Second-High	1,260.2	1,374.7	1,260.2	**N/A**	**1,374.7**	**10,000**	**8,625**	**500**
NO_2	PA	Washington	Charleroi	42-125-0005	Annual	Maximum	51.0	44.0	43.0	**N/A**	**51.0**	**100**	**49.0**	**1.0**
$PM_{2.5}$	PA	Allegheny	Clairton	42-003-3007	24-Hour	98^{th} Percentile	26.0	20.0	19.0	**21.7**	**N/A**	**35**	**13.3**	**1.2**
					Annual	Average	10.4	9.3	9.8	**9.8**	**N/A**	**12**	**2.2**	**0.2**
PM_{10}	PA	Allegheny	Clairton	42-003-3007	24-Hour	High Second-High	34.0	27.0	28.0	**N/A**	**34.0**	**150**	**116.0**	**5.0**

6.4 CLASS I SIGNIFICANT ANALYSIS

The air quality modeling analysis will determine if emissions from the proposed project result in concentrations of NO_2, PM_{10}, or $PM_{2.5}$ that are greater than the Class I PSD SILs summarized in Table 6-4. The modeled concentrations for the five years of meteorological data will be reviewed. If the significant analysis determines that the modeled concentrations are less than the Class I significant concentrations, then no Class I PSD increment modeling analysis will be performed.

Table 6-4
PSD Class I Significant Impact Levels

Pollutant	Averaging Period	Form	Concentration (µg/m^3)
NO_2	Annual	Maximum	0.10
PM_{10}	24-Hour		0.32
	Annual		0.2
$PM_{2.5}$	24-Hour		0.27
	Annual		0.05

6.5 CLASS II ADDITIONAL IMPACTS ANALYSIS

A discussion of the additional impacts of the proposed AEC on the Class II area surrounding the proposed AEC will be provided. As part of this discussion, the potential growth resulting from the project will be estimated. Additionally, acidification of rainfall, and impacts on soil and vegetation will be qualitatively addressed. A plume analysis will be conducted using the VISCREEN model for any areas where visibility concerns are identified by ACHD.

6.6 EVALUATION OF AIR TOXICS MODELING

To evaluate the potential inhalation health risk from the Project due to air toxics emissions, the published carcinogenic and non-carcinogenic risk factors for the air toxics will be used. Unit risk factors (URFs) are the dose-response values used to evaluate potential carcinogens. An inhalation URF is an upper-bound excess lifetime carcinogenic risk (expressed in cubic meters per microgram [m^3/µg]) estimated to result from continuous inhalation exposure to an air toxic at a concentration of 1 microgram per cubic meter (µg/m^3) in air.

Non-carcinogenic effects are evaluated by reference concentrations (RfCs) for inhalation exposure. The RfC is the continuous inhalation exposure concentration of a substance that is likely to be without an appreciable risk of adverse health effects to the human population over a lifetime. For non-carcinogenic effects, it is assumed that there exists an exposure level below which no adverse health effects will be observed. Below this "threshold" level, exposure to a substance can be tolerated without adverse effects. The potential for non-carcinogenic health effects resulting from inhalation exposure to substances is assessed by comparing an exposure concentration in air to an RfC. The RfC is expressed in units of milligrams per cubic meter (mg/m^3).

To compile the URF and RfC values, the U.S. EPA Integrated Risk Information System (IRIS) database will be consulted along with other regulatory sources for health affects related to air toxics. The following hierarchy of sources were used to determine these values, in accordance with guidance in ACHD's Policy:

- Tier 1 – U.S. EPA's IRIS. In the development of IRIS toxicity values, U.S. EPA undertakes rigorous scientific process and includes toxicity values that are subject to both internal and external peer review by scientific experts and agency consensus review.
- Tier 2 – U.S. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs). The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by the U.S. EPA Superfund program.
- Tier 3 – Other toxicity values. Tier 3 includes additional U.S. EPA and non-U.S. EPA sources of toxicity information. Sources of Tier 3 values include: California Environmental Protection Agency (Cal EPA) Reference Exposure Levels (RELs), Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk levels (MRLs), and Health Effects Assessment Summary Tables (HEAST) toxicity values.

The list of URFs, RfCs, and their references, is shown in Table 6-5. The RfC values were converted to $\mu g/m^3$ for unit consistency.

The carcinogenic and non-carcinogenic risks will be determined following the approach in the ACHD's Policy. Individual AERMOD runs will be completed for each of the five years of meteorological data (2010-2014), utilizing the Project-wide emissions rates for each air toxic and physical stack characteristics outlined in Section 3.6. The maximum annual concentration from

Table 6-5
Inhalation Toxicity Values[a]
Invenergy LLC - Allegheny Energy Center

Air Toxic	CAS Number	Carcinogenic Risk		Non-Carcinogenic Risk	
		Inhalation Unit Risk Factor (URF) ($m^3/\mu g$)	Reference	Reference Concentration (RfC) ($\mu g/m^3$)[b]	Reference
HAP Metals					
Arsenic	7440-38-2	4.30E-03	U.S. EPA IRIS	N/A	
Beryllium	7440-41-7	2.40E-03	U.S. EPA IRIS	2.00E-02	U.S. EPA IRIS
Cadmium	7440-43-9	1.80E-03	U.S. EPA IRIS	1.00E-02	ATSDR
Lead	7439-92-1	1.20E-05	CAL EPA	N/A	
Manganese	7439-96-5	N/A		5.00E-02	U.S. EPA IRIS
Nickel	7440-02-0	2.60E-04	CAL EPA	9.00E-02	ATSDR
All Other Air Toxics					
1,3-Butadiene	106-99-0	3.00E-05	U.S. EPA IRIS	2.0	U.S. EPA IRIS
Acetaldehyde	75-07-0	2.20E-06	U.S. EPA IRIS	9.0	U.S. EPA IRIS
Acrolein	107-02-8	N/A		0.02	U.S. EPA IRIS
Benzene	71-43-2	7.80E-06	U.S. EPA IRIS	30.0	U.S. EPA IRIS
Cobalt	7440-48-4	9.00E-03	PPRTV	6.00E-03	PPRTV
Ethylbenzene	100-41-4	2.50E-06	CAL EPA	1,000	U.S. EPA IRIS
Formaldehyde	50-00-0	1.30E-05	U.S. EPA IRIS	9.83	ATSDR
Hexane (n)	110-54-3	N/A		700	U.S. EPA IRIS
Naphthalene	91-20-3	3.40E-05	CAL EPA	3	U.S. EPA IRIS
Propylene Oxide	75-56-9	3.70E-06	U.S. EPA IRIS	30	U.S. EPA IRIS
Toluene	108-88-3	N/A		5,000	U.S. EPA IRIS
Vanadium	7440-62-2	N/A		1.00E-01	ATSDR
Xylenes	1330-20-7	N/A		100	U.S. EPA IRIS

[a] Air toxics thresholds were assessed using the following hierarchy of sources:

Tier 1 – U.S. EPA's IRIS.

Tier 2 – U.S. EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs). The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by U.S. EPA's Superfund program.

Tier 3 – Other toxicity values. Tier 3 includes additional U.S. EPA and non-EPA sources of toxicity information. Sources of Tier 3 values include: California Environmental Protection (Cal EPA) Reference Exposure Levels (RELs), Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk levels (MRLs), and Health Effects Assessment Summary Tables (HEAST) toxicity values.

[b] RfC values are adjusted from mg/m^3 to $\mu g/m^3$ for comparison with modeled concentrations.

the five model runs will then be used to estimate the carcinogenic and non-carcinogenic risks of the Project.

6.6.1.1 Carcinogenic Risk Characterization

For the carcinogenic risk assessment, the MICR will be calculated for each carcinogenic air toxic. The MICR was calculated using the following equation:

$$MICR = Modeled\ Maximum\ Annual\ Concentration * URF \quad \text{(Equation 6-1)}$$

where "MICR" equals the Maximum Individual Carcinogenic Risk, "Modeled Maximum Annual Concentration" equals the air toxic-specific concentration modeled by AERMOD, and "URF" equals the air toxic-specific unit risk factor.

The cumulative MICR for the mixture of carcinogens is equal to the sum of the MICRs for each individual substance. According to ACHD's Policy, if the cumulative MICR for the Project is less than 1×10^{-5} at or beyond the Project Site's public exposure boundary, no further assessment for carcinogenic effects is required. If the cumulative MICR for the Project is greater than 1×10^{-5} at or beyond the Project Site's public exposure boundary, a cumulative analysis is required, which takes into account actual emissions from nearby, existing sources.

6.6.1.2 Non-Carcinogenic Risk Characterization

For non-carcinogenic risks, the HQ will be calculated for each non-carcinogenic air toxic. The HQ was calculated using the following equation:

$$HQ = \frac{Modeled\ Maximum\ Annual\ Concentration}{RfC} \quad \text{(Equation 6-2)}$$

where "HQ" equals the Hazard Quotient, "Modeled Maximum Annual Concentration" equals the air toxic-specific concentration modeled by AERMOD, and "RfC" equals the air toxic-specific reference concentration.

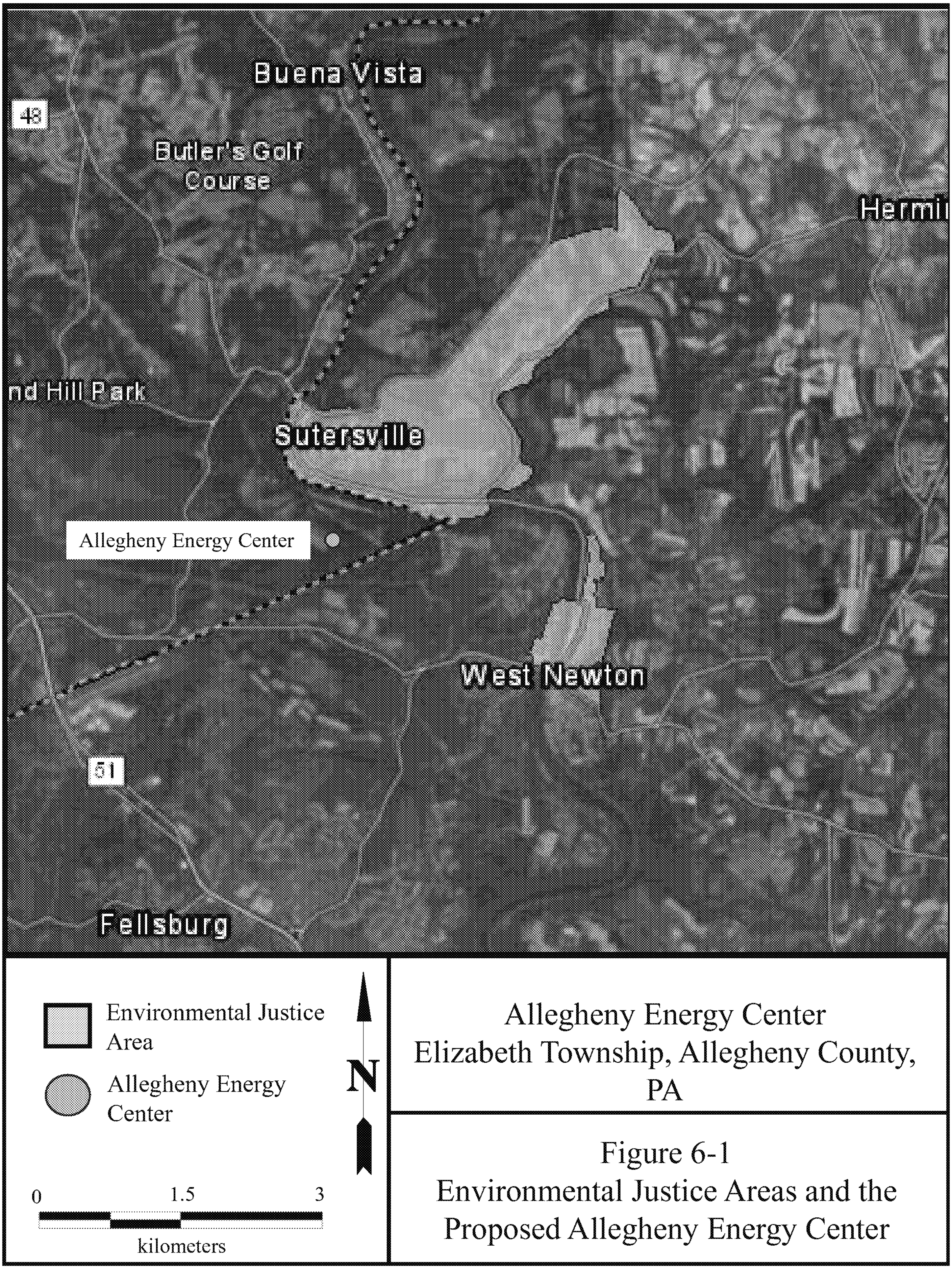
The cumulative HI for non-carcinogens is equal to the sum of the HQs for substances that affect the same target organ or organ system. All the toxics evaluated were conservatively summed regardless of organ system. According to ACHD's Policy, if the HQ of each non-carcinogen is less than 1.0 and the HI for the Project is less than 2.0 at or beyond the Project's property line, no further assessment of non-carcinogenic effects is required. If the HQ of any non-carcinogen is greater than 1.0 or the HI for the Project is greater than 2.0 at or beyond the public exposure boundary, a cumulative analysis is required, which takes into account actual emissions from nearby existing sources.

6.7 ENVIRONMENTAL JUSTICE AREAS

A review of Environmental Justice Areas (EJA) within three km of the site was conducted. An EJA is defined as an area having a poverty rate of 20% or greater or a non-white population of 30% or greater as determined by 2015 Pennsylvania Census Block Group data. There are two census tracks in Westmoreland County located within three km of the proposed AEC that are classified as EJAs. Figure 6-1 shows a map identifying the EJAs surrounding the proposed AEC. As ACHD does not have an Environmental Justice (EJ) policy, AEC will utilize the Pennsylvania Department of Environmental Protection's (PADEP) EJ policy. PADEP's EJ policy identifies a project impacting an EJA if the project is located in an EJA or if there are modeled emissions, resulting in concentrations greater than the SILs in the EJAs. Therefore, the SIL analysis will determine if modeled concentrations are greater than SILs in the EJA identified in Figure 6-1. If it is determined that the project does impact the identified EJA, Invenergy will follow the PADEP-enhanced public participation process.

6.8 SUBMITTAL OF AIR QUALITY MODELING RESULTS

A detailed air quality modeling report will be submitted as part of the proposed AEC project Installation Permit application. The air quality modeling report will review the procedures that were followed in the air quality modeling analysis. An electronic copy of the air quality modeling input and output files, as well as supporting files (e.g., meteorological data, building downwash analysis, etc.), will be included as an appendix to the Installation Permit Application. Hardcopy supporting information will also be included in the appendix to the Installation Permit application.



Allegheny Energy Center
Elizabeth Township, Allegheny County, PA

Figure 6-1
Environmental Justice Areas and the Proposed Allegheny Energy Center

7. REFERENCES

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